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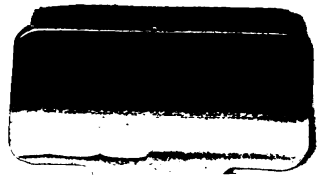

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TRANSACTIONS

OF THE

38275-

American Horticultural Society,

FOR THE YEAR 1885,

BEING A REPORT OF THE SIXTH ANNUAL MEETING, HELD AT NEW ORLEANS, LA., JANUARY 14TH TO 20TH, 1885.

TOGETHER WITH

A FULL LIST OF PAPERS READ, WITH ACCOMPANYING DISCUSSIONS; ALSO, LIST OF MEMBERS, ROSTER OF OFFICERS OF HORTICULTURAL SOCIETIES, BUSINESS DIRECTORY, AND COMPLETE LIST OF AWARDS IN THE HORTICULTURAL DEPARTMENT OF THE WORLD'S INDUSTRIAL EXPOSITION, AT NEW ORLEANS, LOUISIANA.

VOL. III.

BY W. H. RAGAN, SECRETARY.
Professor of Horticulture and Superintendent of Parks, De Pauw University, Greencastle, Ind.

INDIANAPOLIS:
CARLON & HOLLENBECK, PRINTERS AND BINDERS.
1885.

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INTRODUCTORY.

Volumes I. and II. of the Mississippi Valley Horticultural Society are succeeded by Volume III., which, under its new and more comprehensive title, now appears as the Transactions of the American Horticultural Society. The cause which led to this change of name was not mere *ambition*, but was the necessary result of the steady and substantial growth of the Society under its former title.

In presenting this volume to the public the Secretary can only hope that it may receive the consideration, at the hands of the *critic*, that it may justly merit, simply asking his indulgence to the extent of fairness and justice.

But for sickness, and other unavoidable causes, this volume should have seen the light many weeks since.

With these explanations, this volume is now "turned adrift" to meet such reception as it may merit.

SECRETARY.

OFFICERS

OF THE

AMERICAN HORTICULTURAL SOCIETY

FOR 1885–'86.

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Wisconsin	J. M. SMITH	Green Bay.
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CORRESPONDENTS.

Allan, J. T., Sec'y State Hort. Society, Omaha, Nebraska.
Beadle, D. W., Sec'y Fruit Growers' Association, St. Catharines, Ontario.
Beal, Prof. W. J. (Agricultural College), Lansing, Michigan.
Burrill, Prof. T. J. (State University), Champaign, Ill.
Berckmans, P. J., Pres. State Hort. Society, Augusta, Georgia.
Budd, Prof., J. L., Sec'y State Hort. Society, Ames, Iowa.
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Barnard, Samuel, Pres. State Hort. Society, Table Rock, Nebraska.
Brackett, G. B., Denmark, Iowa.
Bush, Isador, St. Louis, Missouri.
Brayton, Prof. A. W., Indianapolis, Indiana.
Bryant, Arthur, Princeton, Illinois.
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Colman, Col. N. J., U. S. Commissioner of Agriculture, Washington, D. C.
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Cowing, Granville, Muncie, Indiana.
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Grimes, D. S., Denver, Colorado.
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Hale, J. H., South Glastonbury, Connecticut.
Hape, Dr. Samuel, Atlanta, Georgia.
Hilgard, Prof. E. W., State Experiment Station, Berkley, California.
Hudson, E. M., New Orleans, Louisiana.
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Hollister, Capt. E., Alton, Illinois.

Holsinger, F., Rosedale, Kansas.
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Merwin, C. M., Medina, Tennessee.
Manning, Robert, Sec'y State Hort. Society, Salem, Massachusetts.
Morton, Dr. J. W., Nashville, Tennessee.
Mohr, Dr. Charles, Treas. American Forestry Congress, Mobile, Alabama.
McKay, Dr. H. E., Pres. State Hort. Society, Madison Station, Mississippi.
McWhorter, Tyler, Aledo, Illinois.
Munson, T. V., Vice Pres. American Hort. Society, Denison, Texas.
Minier, George W., Minier, Illinois.
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Pierce, L. B., Talmadge, Ohio.
Rock, John, San Jose, California.
Rosaman, J. W., Gadsden, Tennessee.
Roy, William, Owen Sound, Ontario.
Riley, Prof. C. V., United States Entomologist, Washington, D. C.
Ragan, Z. S., Treas. State Hort. Society, Independence, Missouri.
Roe, Rev. E. P., Cornwall-on-the-Hudson, New York.
Stuart, W. R., Ocean Springs, Mississippi.
Smith, J. M., Pres. State Hort. Society, Green Bay, Wisconsin.
Scott, D. Wilmot, Sec'y American Nurserymen's Association, Galena, Illinois.
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Stayman, Dr. J., Leavenworth, Kansas.
Thomas, J. J., Author Fruit Culturist, Union Springs, New York.
Teas, E. Y., Dunreith, Indiana.
Tracy, Prof. S. M. (Agricultural College), Columbia, Missouri.
Vick, James, Rochester, New York.
Webber, A. W., Nashville, Tennessee.
Weltz, Leo, Treas. State Hort. Society, Wilmington, Ohio.
Webb, A. D., Bowling Green, Kentucky.
Wilder, Col. Marshall P., Pres. Amer. Pom. Society, Dorchester, Massachusetts.
Williams, E., Sec'y State Hort. Society, Montclair, New Jersey.

CONSTITUTION

OF THE

AMERICAN HORTICULTURAL SOCIETY

ARTICLE I. The organization shall be known as the American Horticultural Society. Its object shall be the promotion of horticulture.

ARTICLE II. Any person may become a member upon the payment of two dollars, and membership shall continue upon the payment of two dollars annually.

ARTICLE III. Its officers shall consist of a President, First Vice President, Secretary and Treasurer, and one Vice President from each State, who shall be elected by ballot at each annual meeting. The term of office of the President, Vice President, Secretary and Treasurer shall begin on the first day of July following their election. No person can act as an officer of this Society who does not maintain his membership by the payment of the annual membership fee.

ARTICLE IV. The regular meetings of this Society shall be held annually on the first Tuesday of September, except when otherwise ordered by the Executive Committee, and continue for such time as the committee shall determine.

ARTICLE V. The officers of the Society shall constitute an Executive Committee, at any meeting of which a majority of the members present shall have power to transact business.

ARTICLE VI. Special meetings of the Society may be called by the Executive Committee, and meetings of the committee may be called by the President and Secretary.

ARTICLE VII. This Constitution may be amended by a two-thirds vote of the members present at any regular meeting.

LIST OF MEMBERS.

A

Abner Allen, Wabaunsee.....Kansas.
Agricultural College, Manhattan.....Kansas.
L. F. Adams, Indianapolis .....Indiana.
Henry Avery, Burlington... .....Iowa.
B. F. Adams, Madison .....Wisconsin.
D. C. Allen, Greencastle.....Indiana.
Mrs. Helen V. Austin, Richmond.....Indiana.
Emery Albertson, Bridgeport.....Indiana.
P. M. Augur, Middlefield .... Connecticut.
Dr. Joseph Albrecht, New Orleans..... .....Louisiana.
J. J. Albertson, Haddanfield ....New Jersey.
E. W. Allen, Portland ....Oregon.
W. S. Almond, Pilot Point..... .....Texas.

B

Benjamin Buckman, Farmingdale.....Illinois.
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J. C. Blair, Kansas City..... .....Missouri.
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Blair & Kaufman, Kansas City..... .....Missouri.
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David Baird, Manalapan.....New Jersey.

Mrs. David Baird, Manalapan.....New Jersey.
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H. C. Bouton, Anna.....Illinois.
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G. B. Brackett, Denmark.....Iowa.
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A. H. R. Bryant, Pilot Point.....Texas.

C

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Granville Cowing, Muncie.....Indiana.
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Charles Chickering, Red Oak .... Iowa.

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J. A. Durkes, Weston..... .... Missouri.
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F. L. Dancy, Orange Mills .....Florida.

E

William Ent, Savannah .....Missouri.
J. C. Evans, Harlem..... .....Missouri.

*Deceased.

Parker Earle, Cobden.....Illinois.
Mrs. Parker Earle, Cobden.....Illinois.
Frank S. Earle, Cobden.....Illinois.
G. W. Endicott, Villa Ridge.....Illinois.
Charles N. Eley, Smith's Point.....Texas.

F

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F. Fix, Prairie City.....Missouri.

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W. Greene, Davenport.....Iowa.

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Nathan Harvey, Bloomingdale .....Indiana.
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R. A. Hunt, Euclid..... Ohio.
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I

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J

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James T. Johnson, Warsaw ..... Illinois.
Herman Jaeger, Neosho.. ..... Missouri.
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K

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John Kaufman, Kansas City..... Missouri.
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Mrs. A. C. Kendel, Cleveland..... Ohio.
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A. W. Kerr, Sherman ..... Texas.
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Mrs. George J. Kellogg, Janesville ..... Wisconsin.
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W. F. Kernan, Clinton..... Louisiana.
Frank A. Kimball, National City..... California.
Warren C. Kimball, National City..... California.
J. S. Kerr, Sherman..... Texas.

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T. T. Lyon, South Haven.....Michigan.
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Victor Litorey, Wartburg.....Tennessee.
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W. H. Larabee, Plainfield.....New Jersey.
Ralph H. Lodge, Cuyahoga Falls.....Ohio.

M

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W. P. Mesler, Cobden.....Illinois.
S. G. Minkler, Oswego.....Illinois.
Tyler McWhorter, Aledo.....Illinois.
J. H. Masters, Nebraska City.....Nebraska.
T. V. Munson, Denison.....Texas.
Mrs. Maria Munson, Denison.....Texas.
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M. B. Munson, Denison .....Texas.
G. W. Minier, Minier.....Illinois.
D. Magone, Ogdensburg.....New York.
Prof. A. B. McKay, Agricultural College.....Mississippi.
Wm. P. Miller, Rising City .....Nebraska.
B. S. Miles, Gray's Summit.....Missouri.
E. G. Mendenhall, Kinmundy .....Illinois.
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Nelson Millet, Denver.....Colorado.
J. R. Martin, Denison.....Texas.
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James D. McDiarmid, Bear Lake .....Michigan.
G. N. Milco, Stockton .....California.
Col. J. B. Mead, Randolph.....Vermont.
M. L. McClave, Benton Harbor.....Michigan.

N

Ira M. Needles, Atlantic.....Iowa.
J. S. Newmyer, Love Lake.....Missouri.
E. F. Nelson, New Orleans .....Louisiana.
James Nimon, Denison .....Texas.
J. C. Newberg, Pilot Point.....Texas.
A. F. Newell, Warren .....Ohio.

O

N. Ohmer, Dayton.....Ohio.
C. B. Olin, Ottawa.....Kansas.
Rev. E. H. Otting, Wadsworth.....Ohio.

P

W. S. Plummer, Leavenworth.....Kansas.
S. C. Palmer, Kansas City.....Missouri.
Charles Patterson, Kirksville.....Missouri.
George P. Peffer, Pewaukee.....Wisconsin.

Prof. E. A. Popenoe (Agricultural College), Manhattan.....Kansas.
J. C. Plumb, Milton.....Wisconsin.
J. H. Priest, Greencastle.....Indiana.
L. B. Pierce, Talmadge.....Ohio.
Charles F. Pierce, 164 Dearborn street, Chicago.....Illinois.
William Parry, Parry P. O.....New Jersey.
Prof. D. P. Penhallow (McGill College), Montreal .....Quebec.
H. A. Portman, Greenfield.....Tennessee.
C. G Patten, Charles City.....Iowa.
B. F. Pancoast, Iola .....Kansas.
John R. Parry, Parry P. O.....New Jersey.
Edward Perry, Denison.....Texas.
J. E. Pleasants, Santa Anna .....California.
S. T. Phœnix, Charleston.....Missouri.
J. L. Perkins, Madison Station.....Mississippi.
L. Plumb, Sharon .....Nebraska.

R

William Radam, Austin.....Texas.
J. W. Ragan, Fillmore.....Indiana.
W. H. Ragan (De Pauw University), Greencastle.....Indiana.
Z. S. Ragan, Independence.....Missouri.
H. H. Ragan, Salem.....Oregon.
J. W. Robson, Cheever .....Kansas.
J. B. Rogers, Milburn.....New Jersey.
T. D. Randall, 219 S. Water street, Chicago.....Illinois.
E. C. Reichwald, 165 S. Water street, Chicago.....Illinois.
W. E. Rosebro, Crawfordsville.....Indiana.
Dr. J. C. Ridpath, Greencastle.....Indiana.
Arthur E. Rendel, 92 Broadway, New York.....New York.
J. P. Roe, Oshkosh.....Wisconsin.
Horace Rainey, Columbia.....Tennessee.
J. W. Robinson, Towanda.....Kansas.
T. S. Richmond, Holly Springs.....Mississippi.
J. C. Richardson, Greenville.....Alabama.
Elmer Reeves. Waverly.....Iowa.
D. U. Reed, Blue Springs.....Nebraska.
O. P. Rooks, Fruitland Park.....Florida.

A. M. Ragland, Pilot Point.....Texas.
Geo. Richardson, Denver.....Colorado.
D. Redmond, Jacksonville.....Florida.
John Rock, San Jose.....California.

S

William M. Samuels, Clinton.....Kentucky.
Rufus W. Smith, Elmer.....New Jersey.
J. M. Samuels, Malisus.....Tennessee.
E. Ashley Smith, Lockport.....New York.
L. K. Schofield, Fort Scott.....Kansas.
W. P. Stark, Louisiana.....Missouri.
Henry Speer, Butler.....Missouri.
D. Wilmot Scott, Galena.....Illinois.
Dr. H. Schroeder, Bloomington.....Illinois.
Secretary Horticultural Society, Leavenworth.....Kansas.
Dr. J. F. Simonds, Fayetteville.....Arkansas.
Henry Shepley, Nevada.....Missouri.
I. N. Stone, Fort Atkinson.....Wisconsin.
J. S. Stickney, Wauwatosa.....Wisconsin.
Mrs. J. S. Stickney, Wauwatosa.....Wisconsin.
Otto Segessemann, Amazonia.....Missouri.
J. M. Smith, Green Bay.....Wisconsin.
Mrs. J. M. Smith, Green Bay.....Wisconsin.
Joseph Spies, 101 S. Water street, Chicago.....Illinois.
G. W. Stoner, Jewella (Caddo Parish).....Louisiana.
W. R. Stuart, Ocean Springs.....Mississippi.
G. D. Sidway, Jackson.....Mississippi.
E. H. Smith, Dubuque.....Iowa.
Dr. Alex. Shaw, Denver.....Colorado.
James Sanders, Westfield.....Indiana.
C. W. Sexton, Lawrence.....Kansas.
J. C. Stevens, Centreville.....Indiana.
E. F. Stephens, Crete.....Nebraska.
Natt. Stevens, Forney.....Texas.
Prof. James Satterlee, (Agricultural College), Lansing.....Michigan.
W. A. Springer, Fremont.....Wisconsin.
A. Stone, Winchester.....Indiana.

J. S. Smith, Carrolton.....Illinois.
W. C. Strong, Brighton.....Massachusetts.
J. I. Southwick, Bennet.....Nebraska.
John Spence, Santa Barbara.....California.
Wm. Sigerson, Winamac.....Indiana.
Geo. L. Shoup, Salmon City.....Idaho.
W. H. Sebring, Bronson.....Florida.
S. C. Satterthwait, Aiken.....South Carolina.
F. R Skinner, Eau Claire.....Wisconsin.
Alphonse Stude, Houston.....Texas.
Prof. Wm. Saunders (Entomologist), London.....Ontario.
E. Shugart, Beatrice.....Nebraska.

T

Marshall Thatcher, Scircleville.....Indiana.
Prof. S. M. Tracy, (Agricultural College), Columbia.....Missouri.
George A. Tryon, Galesburg.....Illinois.
Mrs. George A. Tryon, Galesburg.....Illinois.
L. Traber, Kansas City.....Missouri.
E. Y. Teas, Dunreith.....Indiana.
L. E Tyler, 115 Canal street, New Orleans.....Louisiana.
F. A. Thomas, 104 S. Water street, Chicago.....Illinois.
A. L. Tucker, 167 S. Water street, Chicago.....Illinois.
Wm. Ten Brook, Rockville.....Indiana.
W. H. Thomas, LaGrange.....Missouri.
J. C. Teas, Carthage.....Missouri.
Dr. B. A. Taft, Silverton.....Colorado.
C. Thorp, Weston.....Missouri.
C. B. Turrill, San Francisco.....California.
W. W. Thompson, Smithville.....Georgia.
B. W. Taylor (John Henry & Co.), New Orleans.....Louisiana.
J. D. Thorp, Weston.....Missouri.

U

E. B. Underhill, Poughkeepsie.....New York.

V

J. C. Vickery, Fort Scott.....Kansas.
Voorhees & Co., Detroit.....Michigan.

Prof. H. E. Van Deman (Pomologist), Geneva.....Kansas.
H. G. Vorce, Euclid.....Ohio.

W

R. H. Warder, North Bend.....Ohio.
E. H. Williams, Indianapolis.....Indiana.
E. Williams, Montclair.....New Jersey.
J. K. Williamson, Edwardsville.....Kansas.
Geo. H. Wright, Sioux City.....Iowa.
A. D. Webb, Bowling Green.....Kentucky.
Dr. J. R. Walker, Bay St. Louis.....Mississippi.
Mrs. J. R. Walker, Bay St. Louis.....Mississippi.
Mrs. Nevie Woods, Pecksburg.....Indiana.
Silas Wilson, Atlantic.....Iowa.
James B. Wild, Sarcoxie.....Missouri.
F. Wellhouse, Fairmount.....Kansas.
C. L. Watrous, Des Moines.....Iowa.
Wm. Wesselhoft, Station B., St. Louis.....Missouri.
Chas. H. Weaver, 129 S. Water street, Chicago.....Illinois.
H. S. Williams, Rockledge, (Indian River).....Florida.
S. D. Willard, Geneva.....New York.
I. A. Wilcox, Santa Clara.....California.
F. G. Wilhoft, Dayton.....Ohio.
E. G. Wall, Jackson.....Mississippi.
E. Wilcox, La Crosse.....Wisconsin.
Prof. H. H. Wing, Lincoln.....Nebraska.
Geo. F. Warren, Harvard.....Nebraska.
T. N. Wylie, Pilot Point.....Texas.
Daniel Webster, Denison.....Texas.
W. R. Warner, Cleveland.....Ohio.
Garrett Williams, Whitner.....Arkansas.
Anthony Wiegand, Indianapolis.....Indiana.

Y

J. B. Yellowly, Madison.....Mississippi.
F. Yost, Jefferson City.....Missouri.

PROCEEDINGS

OF THE

SIXTH ANNUAL MEETING

OF THE

AMERICAN HORTICULTURAL SOCIETY,

(FORMERLY THE MISSISSIPPI VALLEY HORTICULTURAL SOCIETY.)

At 2 oclock P. M., Wednesday, January 14, 1885, the Mississippi Valley Horticultural Society assembled for its sixth annual meeting in Exhibitors' Headquarters in the main building of the World's Exposition at New Orleans, and was called to order by Hon. Parker Earle, President.

Among horticulturists of note who were present may be mentioned the following: Prof. Budd, Iowa Agricultural College; Prof. Popenoe, Kansas Agricultural College; Prof. C. V. Riley, Washington City; N. Ohmer, George W. Campbell, Ohio; S. D. Willard, New York; J. A. Stickney, Wisconsin; P. M. Augur, Connecticut; L. B. Pierce, Ohio; George A. Deitz, Pennsylvania; E. H. Calkins, G. B. Bracket, Iowa; A. J. Caywood, New York; T. T. Lyon, W. N. Cook, Michigan; J. M. Smith, Wisconsin; J. T. Johnson, Illinois; S. Barnard, H. Craig, Nebraska; H. Y. Beebe, Ohio; Dr. Samuel Hape, P. J. Berkmans, Georgia; T. V. Munson, Texas; J. T. Hardie, Louisiana; S. M. Tracy, Missouri;

H. E. Van Deman, Kansas; G. W. Stoner, Louisiana; J. C. Plumb, Wisconsin; W. H. Cassell, Dr. H. E. McKay, Mississippi; J. S. Collins, William Parry, John Parry, New Jersey; L. A. Goodman, W. G. Gano, Z. S. Ragan, Missouri; C. M. Hobbs, Indiana; I. Wilcox, W. H. Jessup, W. G. Klee, California; J. P. Roe, Wisconsin; C. M. Merwin, Tennessee; Charles Gibb, Abbotsford, Quebec; Franklin Davis, Maryland; George W. Endicott, Illinois; George H. Wright, Iowa; J. B. Durand, W. Folck, Missouri; D. G. Feely, California; T. S. Gold, Connecticut; Dr. Jewett, Ohio; C. L. Watrous, Iowa; Dr. Charles Mohr, Mobile; W. M. Samuels, Kentucky; H. B. Francis, Missouri.

A brief interval was allowed for the reception of members' dues, after which President Earle proceeded to read his annual address, as follows:

PRESIDENT'S ANNUAL ADDRESS.

LADIES AND GENTLEMEN: We assemble for this our sixth annual meeting of the Mississippi Valley Horticultural Society under circumstances both encouraging and trying. A year ago we undertook, at the request of the management of the World's Exposition, the laborious and unprecedented task of organizing and presenting to the view and study of the multitudes who will gather at this great World's Exposition of Industry, Science and Art, an exhibit of the horticultural products of many countries and of all climates. This was a work which had not been undertaken before in any country, and involved difficulties such as surround no other department of a great exhibition.

It was the purpose and the ambition of the officers of this Society to do a work which would give much pleasure and lasting benefit to the entire horticultural world. We hoped to do something which would distinguish this Society and this Exposition, and constitute a memorable event in the history of the world's horticulture. We desired to bring together in this Exposition Park, in this metropolitan city of the South, on the borders of the Mexican Gulf, illustrations of the resources of the leading countries of the earth in garden and vineyard, in orchard and forest. We desired to give a large opportunity to study the effects of climate and soil, of latitude and longitude and altitude, in the modification of plant and tree growths, and upon the size, form, texture, quality, durability and beauty of the fruits of the world.

All of you who have undertaken to do this kind of work within the limits of a single State, and still more those of you who have helped to create some of our national exhibitions, will be prepared to appreciate something of the magnitude of the work which this Society set for itself to

do. If we have not accomplished as much as we hoped in some directions, I trust you will not charge the failure to any lack of comprehension of the difficulties of the task, or of energy in attempting to surmount the many obstacles to success. I believe your servants have worked faithfully, and I hope you will consider that they have worked intelligently, to promote this great enterprise. At any rate some of us have labored unceasingly for more than a year to bring together an exhibition that would do some honor to American horticulture

I wish here to give full and just credit to the Board of Management, and especially to the Director General of this Exposition, for the very liberal manner in which they have met the views and provided for the needs of this horticultural department. They have authorized a premium list of unprecedented liberality and comprehensiveness, aggregating ten times as much as was ever before offered for similar products; they have erected the largest and finest horticultural building in the world for our exhibition; they sent one of the most eminent horticulturists of the age as commissioner for this exhibition to foreign countries; they have expended large sums in transforming what was but a few months since a wilderness of weeds, full of pitfalls and morasses, into an incomplete but yet comfortable and promising park; and they have in all ways shown an appreciation of the value of horticulture as a great factor in the nation's civilization, which should entitle them to the lasting gratitude of all friends of that cause.

And yet, with all these advantages in our favor, we have not accomplished quite as much as we hoped for. We have not been able to induce the leading fruit and plant growers of some of our States to contribute to our exhibits. There are many men and firms who have grown wealthy upon the patronage of the horticultural public, who yet have not seen it their duty to help make more complete this first attempt at an international exhibition of horticulture. These gentlemen will perhaps grow more liberal when they grow more wise. And then some of our exhibits from abroad have been greatly damaged, and others have failed to reach us entirely, owing to embarrassing detentions in our custom houses. And again, very many important exhibits which were promised to our foreign commission appear to have never been sent at all.

But notwithstanding all of these drawbacks, which we should have expected, I presume we are able to offer you to-day a horticultural exhibition which, for extent, variety, and instructiveness, has never before been equaled in the world. We have to-day exhibits of fruits or plants, or both, from thirty-six American States and Territories, from eleven foreign nations, and from three foreign provinces, in all from just fifty States and countries; and exhibits are promised and expected, later in the season, from several other countries. We have on our tables to day nearly 20,000 plates of fruit, representing all kinds of soil and all sorts of climates, from the rich jungles of Nicaragua to the mountains of Colorado and Idaho, or the cold northern plains of Quebec; from the semi-tropic orchards of Florida to the rich val-

leys of California and Oregon. We can show you more than a hundred varieties of apples from England, some of which are said to come from trees older than the American nation itself. We can show you many varieties from the far-off plains of Central Russia, which have traveled some 7,000 miles to reach this exhibition, and we can show you apples, in limited amount but of inviting appearance, grown on the table lands of Mexico, 8,000 feet above the sea—possibly from the old gardens of the Aztec kings.

You will be able in this exhibition to study certain interesting problems in pomology under more favoring circumstances than have heretofore been offered for such study. You can compare the same varieties of apples as grown in the humid Northern climate of Old England and in the dry valleys of extreme Southern California; as grown in the contrasting climates of Wisconsin and Arkansas; or those grown on the lean hillsides of Vermont or Maine with the products of fertile Kansas and Nebraska—not long since known to our geographers as the "Great American Desert." You may also note the effect of 5,000 or 6,000 feet of elevation and of rainless summers, where water is supplied only by irrigation, as shown in the beautiful tables of the Colorado exhibit. You may contrast the apples from California orchards, where severe freezing is unknown, with those from trees which have to endure forty below zero in Wisconsin or the Province of Quebec. You may study English apples as grown in England and in all parts of the American continent. You may study Russian apples as produced in the interior of Russia and in the interior of America. In fact, the suggestiveness and educational value of this great show of the world's fruits which we have brought together from so many countries is almost without limit. It might have been made more complete if more people had believed in its success, or appreciated its importance and had co-operated for its success. As it is, we may take some pride in what we have done, and we may rest in the calm assurance that we have given an essential service to horticulture as a science and as a great commercial pursuit.

Our efforts in organizing this exhibition have not been confined mainly to securing a great range of varieties of fruits, but have been even greater to secure a varied and opulent show of plants and trees from many countries. In this, too, we have succeeded in a gratifying measure, but not equal to our wish. I fear that in this respect some of you may have expected impossible things. If you had expected that we could transplant large trees and plants, even from the gardens of New Orleans, and have them present all the luxuriance and beauty in their new locations which they had when standing in the places where they had grown for years, then you expect things which no man has ever yet accomplished. And much less has it been possible to bring the great palms of South Florida, Jamaica, and Mexico here, or their wonderful cacti, or agaves, or their beautiful tree ferns, or their curious orchids, or any other of the great catalogue of their tropical beauties, and to preserve the luxuriant verdure and bloom of their native conditions. If any body has expected this, it was a foolish expectation, doomed to disappointment.

What we have hoped to do was to bring together a great variety of vegetable products from the most distant countries and the most diverse climates, and show them side by side, for their beauty so far as we could preserve it, but especially for their instructive interest to the student of botany or of the world's industrial resources. We have not hoped to present you a conservatory filled with all the bewildering luxuriance of tropic bloom and beauty, such as you will see where a generation of care has been given to the development of each delicate and exacting plant. A tropical garden, a perfect lawn, a complete and finished park, can not be made in three months.

But we have collected some very valuable plant exhibits. We can show you over forty varieties of palms, some of them forty feet in height, and still holding a portion of the burden of fruit which began to grow in the summer islands of Florida. We can show royal palms, which six weeks since helped to fringe with their delicate fronds the tropic shores of Mexico. We offer you a very valuable collection of plants from the Botanic Garden of Jamaica, and we invite your inspection of the magnificent collection of plants and trees, embracing over 700 species, which constitute the California tree exhibit. The very extensive exhibits of cacti from Texas and Mexico are attracting great and deserved attention. In fact, we have many exhibits in this division which will reward your attention. I will mention two of great interest which are not yet in condition to be appreciated. One is the valuable and complete collection of American grape vines, scientifically classified, which is the contribution of our esteemed horticultural friend from Texas; the other is the magnificent exhibit of Dutch bulbs, which have been planted in these grounds. When I tell you we have over 20,000 hyacinths in one bed, and that the entire planting of the enterprising house which makes this display amounts to over 230,000 bulbs, you will agree with me that no such an exhibit has probably ever before been made.

Among our European exhibits the fine plantations of rhododendrons, one from Belgium and one from France, promise us a grand display in due time; and the exhibits of cordon-trained fruit trees from France and England will claim the scrutiny of amateurs and professional gardeners.

Not the least important of the exhibits of this department are those in the division of forestry, both living trees and specimens of timber. We have over 8,000 specimens of forest, fruit and ornamental trees planted in this park, embracing nearly every tree of value grown on the North American Continent, from the little Tom Thumb arbor vitæs, not much bigger than your hat, to young specimens of those glorious forest giants—the pines, redwoods and "big trees" which tower 300 feet in height over the ranges of California mountains. Our forestry exhibit is very valuable in the living trees shown, and especially in the great wealth of timber specimens to be seen in nearly all the State exhibits in the government building. No such an exposition of the forest wealth of a nation was ever before made on earth. But this is a wealth that is fast vanishing, and the lesson for every horticulturist and student of political economy to learn here is this: That our own

country has a boundless capacity for timber production, embracing all the most useful woods of the world. Let every man be encouraged to plant trees rather than destroy them, by all this magnificent display.

I have never been more certain than I am now of the usefulness of this Society—of the necessity for the permanent maintenance of such a society. But I think the time has come when we should devise some more efficient means for giving it financial support. It seems to be impossible to support any society of this kind and publish an expensive volume of transactions yearly, as we are doing, upon its membership receipts alone. No horticultural society in this country has been so maintained for many years. All of our State societies have an endowment fund or receive aid from State Legislatures. We are doing a work of national usefulness, being, as we are, the largest horticultural society in the world. I am unable to make you what I consider a practicable suggestion, but submit the matter to your superior wisdom. Of one thing I am assured: that you should be able in some way to pay your Secretary. The Secretary of this Society should be able to devote all of his time to its great work, and he should be well paid for his services. Of one other thing I am assured; that you should select a man for my successor who has qualifications which I lack—great energy and wisdom in directing the work of the Society, and abundant means with which to pay all the expenses of running it as it should be done. To such a man I desire now to turn over the responsibilities and the honor of this most honorable position, which I have borne all too long.

I return you my most sincere thanks for all the kindness with which you have for so long assisted my efforts to serve the good cause in which we all labor.

SECRETARY'S REPORT.

Secretary Ragan, of Indiana—Owing to extreme pressure of business, it has been quite impossible for me to prepare such a written repo t as I could have wished, and as the material in my hands would have justified me in presenting. I will therefore only present the following brief financial statement, which covers the business transactions of the office for the year just closing:

FINANCIAL STATEMENT OF THE SECRETARY.

Receipts from memberships and Directory fees		$806 00
Receipts for books sold		65 15
Total of receipts		$871 15
Paid J. C. Evans, Treasurer	$270 00	
Paid expenses of office	694 15	
Total expenditures		$964 15
Balance due Secretary		$ 93 00

Respectfully submitted,

W. H. RAGAN, *Secretary.*

INVITATIONS RECEIVED.

At the conclusion of the officers' reports, President Earle presented an invitation from the officers of the Shell Beach Railroad to members of the Society, tendering them an excursion to Shell Beach, on Lake Borgne, and return, during the continuance of the meeting. He also presented a proposition from the officers of the Louisville and Nashville Railroad Company to take members of the Society, in a body, to Pass Christian and return for $1 each. The invitations were accepted, and, on motion, the Chair appointed J. C. Evans, of Missouri; Jno. T. Hardie, of Louisiana, and G. W. Campbell, of Ohio, a committee to arrange the details of the excursions.

President Earle—The Exposition management has appointed a full corps of judges to serve in the various divisions and classes of the Horticultural exhibitions. From this list of names all the various committees will be made up.

The names are as follows: Charles Joly, Paris, France; Wm. H. Boomkamp, Holland; Dr. D. Morris, Jamaica; Charles Gibb, Abbotsford, Quebec; D. W. Beadle, Province of Ontario; Robert Manning, Massachusetts; Charles H. Hovey, Massachusetts; S. D. Willard, New York; Judge William Parry, New Jersey; George W. Campbell, Ohio; T. T. Lyon, Michigan; J. C. Plumb, Wisconsin; E. H. Calkins, Iowa; J. C. Evans, Missouri; George Husman, California; H. J. Rudisill, California; A. W. Webber, Tennessee; H. E. Van Deman, Kansas; P. J. Berckmans, Georgia, E. H. Hart, Florida; T. V. Munson, Texas; W. H. Cassell, Mississippi; S. M. Wiggins, R. Maitre, and J. Fonta, New Orleans.

On motion, the Chair appointed Messrs. Ragan, of Indiana, Smith, of Wisconsin, and Willard, of New York, a Committee on Order of Business.

President Earle—Having disposed of some of our routine work, I will now introduce to you one whom you all know by reputation, and many of you personally: John S. Collins, of New Jersey, who will read a paper on

OUR FRUITS.

BY JOHN S. COLLINS, OF NEW JERSEY.

When the invitation to write an article to be read at this meeting from our worthy Secretary was received, the first impulse was to decline, as being an object entirely out of my line; further consideration, however, induced a few lines on the subject of Our Fruits. The small contribution of our fruits, as shown here now at New Orleans, a few of the later and less perishable, gathered from the different States of our common country, form a collection well worth a trip a long distance to view.

Although the subject of Our Fruits might be made to cover a broad field, it is not my intention to extend, further than to give a few facts connected with the practical part of fruit raising and marketing in the vicinity of Philadelphia. Our first fruit to ripen, the strawberry, is perhaps as precarious paying crop, taking into consideration the cost of growing, as almost any of our fruit crops, varying in profits from nothing to five hundred dollars or more per acre. The destruction of the plants through the season by the white grub worm feeding on the roots, often detracts from the value of a plantation to a great extent, considered by some of our strawberry growers to be the greatest pest to the business that we have. As a partial preventive of the worm and a preparation for planting, I plow the ground the previous autumn, and spread broadcast a ton of kainit per acre, also use stable manure and ground bone. In former years our first strawberries to ripen commanded high prices, but as they have become largely grown in the South, as a matter of fact, our days for receiving high prices have passed; but even now our earliest varieties, at times, sell highest and pay best. We do not use what are called gift packages for our berries; for long shipments ventilated baskets are used, but for berries grown within carting distance, ten to fifteen miles of Philadelphia, there are perhaps more stiff, wooden, square quart boxes used than any others. These boxes are packed into crates of twenty-four to thirty-six quarts, sitting directly on each other, not requiring any racks or divisions between them. With our last pickings of strawberries we gather some of the earlier raspberries, which are marketed in pint baskets or boxes, and, as with strawberries, the earlier fruit selling at highest prices. The Philadelphia market, in 1884, was entirely too well supplied with raspberries, and prices were too low for profit—would not have paid for picking during a part of the season, had it not been for the fruit conservers who bought thousands of bushels at six cents per quart, and thousands more at even lower rates. Before the raspberry season is near through the earliest blackberries are in the market in immense quantities, and although the preservers do not use them largely, they are much more generally consumed by the people of the city, and during the past season brought higher prices than raspberries. Our earlier varieties of blackberries, too, were entirely through before we finished our Cuthbert raspberries. We pay

two cents per quart for picking strawberries, three for raspberries, and one or one and one-half for blackberries; the larger the patch the more choice can be had of pickers and at less price. I have had blackberries picked at one cent a quart in lots of over 20,000 quarts in a day, while others in the vicinity with small patches were paying one and one-half cents per quart for picking a few hundred quarts. Although we would prefer the Southern growers would not crowd our markets, we do not wish to forego the privilege of shipping our berries and fruits North if price in the markets there warrant us in that extra expense.

With our tree fruits, after the orchard is sufficiently old and large enough to bear, I have found, if not cultivated, will require more fertilizer of some kind to keep up a good, healthy annual growth than is required with cultivation, unless the plan of pasturing with hogs or sheep is resorted to, and which I consider an excellent method. I have been practicing for the past two or more seasons spraying the trees once or twice soon after the blossoms fall; have used a mixture of one-half to three-quarters of a pound of Paris green to one hundred gallons of water, and consider the spraying has been beneficial to the fruit crop. The application has not been very expensive. I have used a cask holding about one hundred gallons on a wagon, with a boy to drive the team, one to direct the spray, and a man to work the force pump.

Our apples and pears are nearly all marketed in baskets, costing from $6 to $40 per hundred, and holding from three-eighths to five-eighths of a bushel; if the fruit is very scarce or of fine quality it will pay to use the smaller packages. The baskets nest together, and in returning them they are much lighter and less cumbersome than boxes. We begin to market the fruit early in July, and have a succession to ripen until late autumn.

In diverting the use of land to fruits that formerly produced grain and hay caused me to have a surplus barn, not needed for those things, moved to a location by the side of which, in winter, is an ice pond. I had the building lined and filled in with sawdust twenty to twenty-four inches thick on the inside, and overhead, about six feet from the ground, strong wooden timbers were put across, on which, by the aid of horse power in cutting and hoisting, from one hundred to one hundred and fifty tons of ice were stored —under which is a room for storage, which has been found very convenient for keeping berries a few days, enabling me to regulate my pickings more satisfactorily to meet the markets on days most desirable. Later on in the season, as apples and pears ripen and the market is overstocked with all kinds of fruit, it was found very convenient. At one time the past summer I had over 3,500 baskets of that fruit waiting for an advance in the market. I have known the price of Maiden's Blush apples to double or triple in as many weeks: Orange Pippin, too, has proved valuable to store for longer or shorter time.

With pears there is nothing better for cold storage than the Bartlett. It is one that is justly popular in the markets and has been very largely planted

for perhaps the past generation, and at the time of ripening the market for them is oversupplied; but if the pears are held at cold temperature for a time, the market will be ready for them at an advance of 200 to 300 per cent. If the fruit is picked at a proper time (before too ripe) and carefully handled, it can be kept as long as is desired. I have never yet found the drip, or water, from the melting ice overhead to be of any disadvantage to apples or pears; have allowed it to pass freely through the crates containing the fruit.

In our latitude apples and pears ripen earlier in fall. Varieties that keep all winter and into the following spring at the North are decayed and gone with us. Here again cold storage is convenient and profitable, enabling us to hold apples and pears until berries ripen the following season.

DISCUSSION ON COLD STORAGE OF FRUITS.

Mr. Ohmer, of Ohio—Formerly we were taught to regard a dry atmosphere as best for fruits, especially in cold storage. I would ask Mr. Collins if this is true?

Mr. Collins, of New Jersey—For apples and pears I regard a damp atmosphere as the best. They not only keep better but do not lose so much by shrinkage. For berries and the softer fruits I should prefer a dry atmosphere.

Mr. Van Deman, of Kansas—Then you would regard a dry atmosphere in cold storage as a fault, especially for apples and pears?

Mr. Collins—I should, from the fact that they keep no better and lose heavily by shrinkage.

Mr. Augur, of Connecticut—Do the russet pears and apples keep as well as smooth-skinned varieties?

Mr. Collins—I can not answer, not having had experience.

Mr. Pierce, of Ohio—How long will apples and pears keep after being taken out of cold storage?

Mr. Collins—From one to two weeks, as very much depends on the outside temperature.

Mr. Stoner, of Louisiana—Will pears color as well in damp as in dry storage?

Mr. Collins—By no means.

Mr. Pierce—There is a very successful storage house in Cleveland. They use dry air for oranges and lemons, and damp for apples and pears.

Mr. Plumb, of Wisconsin—What amount of moisture will an atmosphere of 35° or 36° contain? and is this not about the proper temperature for the successful keeping of fruits?

Mr. Deitz, of Pennsylvania—A close atmosphere at a temperature of 36° will contain moisture enough. They will keep just as well, or even better, in a dry atmosphere, but will lose heavily by shrinkage.*

Mr. Cassell, of Mississippi—If I can keep my Duchess pears for four weeks in cold storage it would double their value.

Mr. Caywood, of New York—I visited Mr. Collins' house. I found myself quite wet when I came out from the drippings from the ice chamber overhead. His earliest fall apples were in good condition, though badly handled in gathering. They went to market in good condition, as I saw them in the Philadelphia markets afterwards.

Mr. Collins—I have no trouble in keeping the Duchess pear, if picked early.

Mr. Brackett, of Kansas—Is not decay more certain and rapid if fruit is kept damp?

Mr. Collins—No; fruit is itself a moist body. It will keep better on a cellar floor than in the dryer portions of the room.

Dr. McKay, of Mississippi—I have just opened some Winter Nellis pears, kept in an ordinary room since October, and they are in good condition; those in cold storage are not good.

Mr. Wilcox, of California—Are there not other conditions besides moisture and low temperature that are desirable?

Mr. Roe, of Wisconsin—Regular conditions promote long keeping of fruits.

Mr. Campbell, of Ohio—Belle Lucrative and other fall varieties of pears come out of cold storage in good condition now.

Mr. Caywood—Having noticed grapes that fall upon the ground and are covered with leaves keeping well, induced me to try some

*NOTE.—At a temperature of 35° the elastic force of aqueous vapor, in a saturated atmosphere, equals a perpendicular pressure of 0.204 of an inch of mercury, and at 80° of 1.023 inches; hence, the absolute quantity of water in the form of vapor in the air would be five times as much at 80° as at 35°. SECRETARY.

placed on the ground on the north side of a building and covered with leaves, where they kept well for several weeks. I have often found grapes that had lain in this way all winter in a sound condition and the flavor but slightly impaired.

Mr. Augur—Fruit will keep much better if picked before fully ripe. If very ripe it will not keep well, even in cold storage.

Mrs. Earle, of Illinois—Moisture and temperature are closely allied in producing decay. Fungi, which aid decay, thrive in a moist, warm temperature.

Mr. Durand, of Missouri—I once stored a lot of apples in a cave, at an ordinary temperature. The cave was very damp, but the apples kept well until late in the spring.

Mr. Merwin, of Tennessee—Mrs. Earle is right about the conditions of decay. Peaches will not keep as well wet as dry. In a low temperature they keep longest.

Mr. Munson, of Texas—Bacterial growth and its laws are really at the bottom of efforts at fruit keeping. General principles are safe to follow when facts are wanting. Conditions of growth of germs, moisture, temperature and air, are necessary in certain relations for decay. Under water you exclude air and germs. If air is disinfected and germs afterward excluded, decay is impossible.

Mr. Van Deman—Mrs. Brackett, of Kansas, has tried the cotton-batting cap for fruit cans, and finds it successful. The principle involved in this plan is the exclusion of germs, which have been expelled by heat, by the use of the batting, through which they can not re-enter. The skin of fruits, when unbroken, prevents the passage of germs.

Mr. Durand—My wife's experiment in this line was not successful.

Mr. Gould, of Minnesota—We store our fruit in rather damp cellars, and as cool as can be not to freeze. Fruit certainly keeps best in damp cellars.

Mr. Dietz—The practice in California is to pick fruit very early, before it is ripe, for long shipments. The same is necessary for keeping in cold storage. In cold storage of some years ago fruit did not keep well after taking out. Now they pick early, and the fruit keeps well after being taken out.

President Earle, of Illinois. This is an interesting topic, but we have, perhaps, devoted as much time to it as we can afford.

Mr. Lyon, of Michigan—Before proceeding to the next regular topic, I desire to move the appointment of a Committee on Nomenclature of Fruits, to co-operate with a similar committee of the American Pomological Society.

The motion prevailed.

The President—The subject of our next paper will be "Nomenclature of Russian Fruits," by a gentleman who has done a great work for the northern portion of our country, especially. I have great pleasure in introducing Mr. Charles Gibb, of Quebec.

ON THE NOMENCLATURE OF THE RUSSIAN FRUITS.

BY CHARLES GIBB, ABBOTSFORD, QUEBEC.

What has been our authority on this continent for the naming of our Russian fruits? Usually the name under which they had been received. What is the standard of authority in Russia? I suppose the Russian Pomology, written by Dr. Regel. It seems to embrace the earlier works of Phlotov and of Krasnoglazov, and I am not aware that the careful and voluminous notes of Mr. Shroeder, of Petrowskoe Rasumowskoe, Moscow, have ever been published. Dr. Regel, however, regards his Pomology merely as a "report," a collection of data to be added to from year to year, and yet no edition has appeared since 1869.

Nomenclature in Russia is in a very confused state. In the Russian Pomology, I find Aport, noted as a synonym of Antonovka, Titovka of Aport, Red Calville of Titovka, Titovka of Steklianka, Anisovka of Borovinka. This, however, gives an extreme view of the case. We do find, however, different names given to the same fruit in different places. For instance, Count Orloff and Grand Sultan, received by Ellwanger and Barry, of Rochester, N. Y., the latter I believe from Mr. Rivers, of Sawbridgeworth, England, prove to be what we have long known as White Astrachan; another apple under the name of Grand Sultan received from another source in England is like Yellow Transparent. Then we find the same name given to different members of the same family, and even to widely differing types. For instance, Arabka, received by Ellwanger and Barry, from Moscow (not from Mr. Shroeder, but from some one else, name I can not give), is a true Arabka, yet not the Arabka which Mr. Budd and I saw at Volsk; not the same as that which Mr. Budd has sent me, and which he received either from Mr. Shroeder or from Dr. Regel. Hence we see that all Russian fruits, sent out for experimental purposes, should be accompanied by something to note the source from which each was received. We have in this country Arabka received by the

Department of Agriculture at Washington, from Dr. Regel, by the Iowa College, and from Mr. Shroeder, by Ellwanger and Barry, from another source in Moscow, also by the Iowa College from Kursk, and from Voronesh. I know we have three different apples and I think four among these six importations of Arabka. Besides this the Iowa College has Herrenapfel from Mr. Shroeder, of Moscow, from Wagner, and from Goegginger, of Riga, and from Wohler, of Wilna; and the Department of Agriculture received it from Dr. Regel. The Herrenapfel is an Arabka. Imagine then the confusion that will arise from sending out Russian apples without noting the sources whence they were received.

The manuscripts which accompany importations render the Russian sounds into English each from its own standpoint. Hence, in one we find Luzoff, in another Jussow, both equally correct, and yet at first glance we might not see that they were the same. In the list received by the Iowa College from Petrowskæ Rasumowskæ, near Moscow, in Mr. Budd's copy, I find Sheltnii and Cicluii for Joti or Joltui, besides other variations of the word, and in the list issued by the Department of Agriculture I find Scholti Schotoi, Schaltui, Scholtæ and Scholto. In this latter case, however, the printer is in part to blame, and thus through a combination of causes we find words like Walisonce for Nalivnæ, words scarcely recognizable. Owing to this the Iowa College has issued its Russian apples, for the most part, by number; but this will not do. Mistakes always have and always *will* take place when varieties are propagated by numbers, and besides this (as I have already shown in my paper on the Russian apples imported by U. S. Department of Agriculture in 1870), Dr. Regel's pomology, issued in 1868, the collection sent by Dr. Regel to Iowa in 1879, and Dr. Regel's catalogue of 1882, differ as to the numbers given to certain varieties.

The translation of these names has been very faulty, sometimes merely unmusical, Smelling apple, Sandy Glass and Lieby, which last probably refers to a recumbent form of tree. We have, also, in the Department list, in one instance, Krimskæ translated Krimtarter. It is true the Krim, the inhabitant of the Crimea, as we would say, is a Tartar, yet juicy Krimtarter seems a strange compound and but faintly suggests a Crimean transparent apple. But sometimes these translations are wholly wrong and misleading. In the Department list we have Erdbeer, or Strawberry apple, translated Red Calville. Astrachanskæ Skvosnæ is not Red Astrachan, but Transparent Astrachan. Pipka Govkaya is the Bitter, not the Butter Pipka. Schirokolitchiko, I am told, is not the Broad Leaved, but the Broad Cheeked apple; and Skruijapel, or Skrischapel, I am also told, does not mean Cross apple, yet it has been sent out both from Washington and from Ames under that name. The Iowa Agricultural College have sent out very few of their first importations by name, yet among them I see that the Pipka Ostrokonetchnaya has been issued under the unfortunate name of Astrachan Pippin.

Some of the Russian names, like many of the German, French and English names, are altogether too long. Nasliednik Nikolai Alexandrovitch is

too long for the name of an apple. We need names our farmers can spell and pronounce. Still let us beware of the fault of over-translation. Anis and Anisovka are better names than Anisette, Titovka a better name than Titus, and besides it points directly to its place of origin, the little hamlet of Titov, near Kalonga; Antonovka, perhaps, a better name than Anthony; and a name like Langer Griiner positively must not be sent out under the name of Long Green, unless it be distinctly understood that this Long Green is the Langer Griiner, of Kaczynsk, of Warsaw, or whatever person or place received from.

Thus we see, that owing to a combination of causes, we are drifting into sad confusion regarding the nomenclature of our Russian fruits. The work has its difficulties, but the longer we put it off the greater they will become.

I wish to draw the attention of the members of this Society to this matter, and hope that by their aid the American Pomological Society, at its next meeting in September, may be able to appoint a committee prepared to act at once and give to these fruits the names they are to be known by on this continent.

DISCUSSION ON MR. GIBB'S PAPER.

President Earle—This paper is of much value to those of us who live under the shadow of the arctic circle. Its discussion will be of great interest to members who belong to the extreme northern portion of our country.

Mr. Roe, of Wisconsin—I approve Mr. Gibb's suggestion to simplify these Russian names. After I received our last year's report, in which this subject was discussed at length, I wrote an article upon Russian fruits for a Milwaukee paper, which was not published, the editor admitting that the names were too much for him.

Mr. Barnard, of Nebraska—We have never found a Russian apple in Nebraska that is as good as the Ben Davis. If we can determine the southern limit of profitable culture of Russian varieties it will save our people much needless expense in experimenting with them.

Mr. Willard, of New York—We have no better and more valuable early apple in our State than the Yellow Transparent. This being the case, can we not hope to find others of similar origin that may prove equally valuable?

Mr. Stickney, of Wisconsin—Many of these varieties are of great value to us of Wisconsin. We will not be able to draw lines north and south of which a given variety will prove valuable or

not. The specimen orchard of Mr. Tuttle, of Baraboo in our State, produced this year more than fifty varieties of Russian apples, many of which are very promising. Mr. Gibb has not overestimated the importance of carefully rectifying the nomenclature of our Russian fruits. Without this, designing parties will continue to impose upon our people with worthless varieties. If we can only select from varieties now on trial five or ten varieties of value in the North our labors will have been well spent.

Mr. Lyon, of Michigan—We have found no Russian variety that is good enough in quality. The Alexander is good to look at and to cook, but that is all. I think it is possible for us to originate seedlings from Russian varieties that may prove valuable.

Mr. Cassell, of Mississippi—Men differ as to what constitutes superior excellence. In the catalogue of the American Pomological Society the Red Astrachan is double starred in almost every State.

Mr. Plumb, of Wisconsin—We of Wisconsin are anticipating satisfactory results from the labors of Mr. Gibb and Prof. Budd. We expect, through their efforts, to infuse new "blood" into our strain of apples. We expect, through this source, to carry the limit of apple growing from three to five hundred miles further northward. We do not expect to confine ourselves to varieties introduced, but to their seedlings and crosses.

Mr. Van Deman, of Kansas—I desire to introduce a resolution on this subject:

Resolved, That it is the sense of this meeting that, except for the extreme northern portions of the United States and the Canadas, the entire list of Russian apples is considered as unworthy of propagation.

A Member—There is no more valuable apple in Florida than the Duchess of Oldenburg.

President Earle—A society embracing so wide a range of territory as ours does may properly discuss questions like this, although of local interest to certain sections only.

Mr. Van Deman—Those of us who live in the central portions of the United States are not obliged to take hold of these apples. We want to keep the Russian sorts to the North. We don't need them. I have never seen a Russian apple of better than fourth-rate quality.

So of the whole class, including the Red Astrachan. We have no place for them on our list.

Mr. Munson, of Texas—I think, gentlemen, we are not discussing this question in its proper order. We should wait until Prof. Budd's paper is read before committing ourselves.

Mr. Deitz, of Pennsylvania—I have seen as fine Duchess and Astrachans in the markets of Sacramento and San Francisco as ever grew in Wisconsin or Iowa.

President Earle—As Prof. Budd is present, I think it would be well to hear from him upon this subject.

Prof. Budd, of Iowa—I would like to correct some false impressions on this subject. Russia is a large country, and varieties which may do well in some portions of her vast territory may be valueless in other portions. Most varieties that have been introduced heretofore, have been from Western and Southern Russia. The climate and soil here are very different from that of the great plains of Moscow and eastward. We may select varieties of fruits from different portions of Russia, which may be suitable to cultivation in almost any portion of the Mississippi valley. In Krakow (Silisia) we find apples comparable to our Fameuse, Wealthy, and McIntosh's Red. In Silisia many sorts of late keepers would be late keepers in Kansas and Missouri. The Winter Citron is like Grimes's Golden, and would do well in West Kansas. It has a thick, coriaceous leaf, with two or three more rows of palisade cells than other apples. From this section to Kiev, in Southern Russia, we may select fifty or more apples which would be valuable in Kansas. On the eastern plain, as far as Orel, we get a race of apples not equal in quality to Winter Citron. At Saratov, a dry climate, we find a race of apples like Duchess. Here you will find hundreds of varieties varying greatly in quality and time of keeping, some of which are said to be as much as eight hundred years old. In Kazan, where the temperature often marks —45°, we found beautiful orchards loaded with apples. The Anis apple is from this region. It is as good as the Winesap, and has stood the last two test winters at Bismarck, Dakota. In Kansas it would be a fall apple. The apples of some parts of the dry east plain will doubt-

less prove valuable in Texas and New Mexico. Some of these will prove to be good keepers in Kansas and Nebraska, while some of them are of infinitely better quality than Ben Davis. Most of our cultivated cherries are from the South of Europe, and are not to say successful in the Mississippi valley. Our Early Richmond and Kentish are of the Montmorency family. There are cherries on the dry east plains of Europe that would do well with us. Some of these resemble our Morellos, and are found in large quantities. They are grown on small bushes but little larger than currant bushes, and are produced in such quantities that they load trains with them. There are none of them so poor as Early Richmond. At Warsaw the Flemish Beauty pear is abundant. East and northeast this variety disappears and you find a mixture with the wild pear, a forest tree in Russia. In quality some of these crosses equal Bessemianka, resembling the Flemish Beauty in leaf and tree, but will stand a temperature of —45° without injury. It is seedless, and this indicates its hybrid character, the cross being so violent as to take the seeds out. On the Volga we find the Bergamotts, with leaves like the Sand pears. In point of hardiness they equal the Anis and Oldenberg apples. Pears from St. Petersburg and the Baltic would blight with us as quick as the Flemish Beauty, while it is probable that these Bergamotts from the east plain would resist this disease. If the varieties of fruits introduced from Russia are not of themselves valuable in this country may we not hope to find among their seedlings those adapted to our varying tastes and necessities?

Mr. Jessup, of California—I will ask Prof. Budd to except California from his sweeping criticism of our country for cherry growing. We in California have harvested as much as seventeen hundred (1,700) pounds of cherries from one tree, and from ten acres seventy-six thousand (76,000) pounds have been produced in a single season.

Mr. Caywood, of New York—I am satisfied that we must harden up our varieties of fruits by crossing them with the Russian sorts.

Mr. Van Deman—I only speak for our State when I assert that we can do better than to cultivate any of the Russian apples with which I am acquainted.

Mr. Patterson, of Missouri—I hope the resolution will not pass; not because we need the Russian varieties in my section, unless they shall combine other excellencies with their hardiness, but because such combinations may yet be found in some of them. But I apprehend the resolution is intended to guard the unintelligent planter against indiscriminate planting of all such foreign, untried sorts. That class can not be reached by our discussions, reports or cautions; they do not read them; may scarcely know of our Society, and perhaps but little of this great Exposition; they are joined to their idol, ignorance, and I would let them alone. I regard them as greater enemies to fruit growing than the bogus tree missionary.

Mr. Augur, of Connecticut—I regard the resolution as too strong—too sweeping. People should be allowed to use their own discretion in the purchase of fruit trees.

The resolution was not adopted.

President Earle announced as the Committee on Nomenclature, to co-operate with a similar committee of the American Pomological Society, the following:

T. T. Lyon, of Michigan; Charles Gibb, of Quebec; George W. Campbell, of Ohio; G. B. Brackett, of Iowa; and T. V. Munson, of Texas.

On motion of Mr. Campbell, of Ohio, a vote of thanks was tendered Mr. Gibb and Prof. Budd for their journey to Russia and for their interesting and instructive reports here.

On motion of Treasurer Evans, of Missouri, it was resolved to accept the invitation of the L. & N. Railroad to visit Pass Christian, at a time that may be hereafter agreed upon.

The Committee on Order of Business reported verbally, through Secretary Ragan, recommending the holding of afternoon sessions only, inasmuch as the management of the Horticultural Department of the Exposition will necessarily take the time and attention of members and officers during the forenoons.

The report was adopted, and the Society adjourned to meet at 2 P. M. to-morrow.

Second Day—Thursday.

AFTERNOON SESSION, January 15

At 2:30 P. M., President Earle called the meeting to order. A large number of delegates having arrived since the preceding meeting, the representatives now present include prominent horticulturists from almost every State and Territory in the United States, together with many foreign countries.

Mr. P. M. Augur, of Connecticut, being present, was called upon to read a paper on Cranberry Culture.

THE CRANBERRY.

BY P. M. AUGUR, OF CONNECTICUT.

The multiplicity of fruits given by Divine Providence is a wonderful illustration of loving favor to the human family, and strikingly so the cranberry.

It occupies a nich by itself, crowding out no other, but of and for itself holding a place occupied by no other and that can be filled by no other, in its own realm. It reigns alone.

The cranberry thrives best where other fruits would hardly grow. It is most beautiful, a most excellent appetizer, a great delicacy, and in a sanitary relation ranks high, and its power to keep and bear transportation from one clime to another commends it to lovers of that which is good *all through our country and beyond.*

It then becomes a practical question where and how we can best raise it? Nature has in part answered this question for us. But only in part. This much we know, it loves a velvety, peaty soil, where pure spring water is abundant. And the secret of success with the cranberry we regard in great measure in introducing the best varieties to a perfectly congenial home and in devoting such attention to them as shall make them pleased and satisfied with their home.

What is the place, then, for the cranberry?

1. A peaty bog, as before mentioned, having a copious supply of good, pure spring or brook water, sufficient to flood the plat in twenty-four hours in spring and early summer and in three days in late autumn. If this is too much to expect approach it as near as possible.

2. An abundant supply of coarse, clean sand in easy reach. Having the right natural conditions, preparation is in order. *First.* The grubbing, which consists in removing all turf and the stumps, bushes and trees, large and small. Remove every species of vegetation, large and small, root and

branch. *Second.* A complete system of open ditches, with proper mains and branches, which shall serve both to drain and to irrigate as desired, remembering that both are necessary according to excess or lack of water.

3. Co-existing with the most perfect system of drainage should exist a good, perfectly constructed dam, with sluices and gates. And here let me say that a bog otherwise unfit from want of living water is often available by supplementing an additional supply in turning another stream. A judicious hydraulic engineer may often remedy a fatal defect at moderate expense; several such cases have come to my knowledge.

4. Sanding: Having removed all live vegetation apply seven to eight inches of clean, sharp, coarse sand, as free from loam or clay as possible, being careful not to endanger the open ditches in the application of sand. Having everything in preparation, mark the ground in rows fourteen to sixteen inches, and with a dibble forked or notched at the bottom and marked to a half inch deeper than the sand. Take each plant or slip and properly push down the depth so when set the plants shall all enter the soft peat or muck one-half inch below the sand. With proper attention to water and drainage success in the start may reasonably be expected. Subsequent work may be expressed in few words: "Allow no vegetation, either annual or perennial, to get the slightest foothold to crowd upon the cranberry."

Varieties: With increased interest in cranberry culture improved varieties appear, differing in time of ripening, as also in form, color, size and flavor.

The chief requisites are to have enough varieties to give early and medium, not to say late, on account of danger from frost, to have diversity of size and color sufficient to suit different fancies. But for the main crop choose two or three only of the safest and most productive varieties. On this score seek the advice of experts in like locations with your own.

Possibilities of failure: Counting chickens before they are hatched is more prudent than relying on certain success in cranberry growing.

My own State has been the arena of some enthusiastic cranberry companies. At one time they were more popular than gold mining companies, but I regret to say that many of them have literally gone to grass. All is not gold that glitters. Cranberry enterprises do not always realize cranberry successes. But failures, dismal though they are, are never without causes. *Now, to overcome these* is the problem *to solve.*

The average cranberry company, with its president, directors, secretary and treasurer, sometimes lacks intelligent comprehension, firmness, and unity of purpose. That "too many cooks spoil the broth" is true in cranberry growing. A wise autocrat is the only adequate ruler of a cranberry bog.

But, seriously, there are evils of no small magnitude in cranberry growing:

1. Damage by untimely frosts. With a quick water supply and a watch of probabilities, danger in spring may be permanently averted. With sharp promptness in autumn gathering may be usually completed.

2. Cranberry Rot. This, like the potato rot, the pear blight, the peach yellows, or the hog cholera, can not always be averted. This trouble is supposed and believed to result from destructive fungi, but how to compass the difficulty is not so easy to answer. A general application of lime has been resorted to, but not with uniform success. So far as we know, we are to do what we can to promote and nothing to impair the general health of the vines.

3. The ravages of the cranberry worms, of which there are two kinds, those which attack the vine and those attacking the fruit. The most destructive probably is the vine worm. Of this there are three or four generations during the season. The first appearance of the miller is usually about the last of April or first of May. The larvæ appear usually about the middle of May, and feed upon the tips of the vines, eating downward, maturing in about ten days. It then webs itself and lies in a chrysalid state about seven days. Then the miller shows itself as before, only in greatly increased numbers. The second generation of the worm is by far the most destructive, and shows strongly the importance of paying close attention to the first appearance of the miller in spring. It is said that three if not four generations of the vine worm are produced during the growing season. In a critical, accurate knowledge of this insect, its first appearance and its habits, lie the security of growers. Unquestionably the power to cover the vines quickly with water gives greatest security to the grower, not only against the vine worm, but also against untimely frosts.

The other worm, or fruit worm. The miller makes its appearance in New England about the last of May. In July it deposits its egg under the skin of the growing fruit. The effect on the fruit is noticed by a premature redness, shown during the latter part of August. Each worm in about ten days destroys a berry, and emerging from it, attacks another, often destroying half a dozen berries.

While this worm destroys considerable fruit, its ravages are much less severe than the vine worm. The only preventive we know is close observation and sudden flowage for a short time to destroy the larvæ, or previously perhaps to prevent the deposit of eggs.

Perhaps enough has already been said to lead the prudent to be cautious about making cranberry investments. Probable success depends, first, upon having the natural conditions right, viz.: a proper soil and location, with abundant living water, available and clear sand at all times, speedy drainage, and in connection with these favoring conditions, sufficient capital and labor and the most intelligent and careful superintendence.

To rush headlong and at haphazard into some joint stock enterprise, of which the stockholders know as little as they do of the mountains of the moon, is to incur probable loss and disappointment. And yet while the future will, like the past, probably bring many failures in the cranberry business, it will also have some grand successes. To avoid the former and to secure the latter in full measure should be the aim of all cranberry growers.

DISCUSSION ON CRANBERRY GROWING.

The Secretary—In arranging the program of this meeting, I have solicited this paper with a view of calling attention to this neglected though important fruit. There are but few sections of our country, as for instance the Cape Cod region in Massachusetts and portions of New Jersey and Wisconsin, where cranberry culture in a commercial way has been attempted, though there are vast regions throughout many of the Northern States and the Canadas where it is almost a natural product of the country. It is in regions of this kind where it is desired to encourage the artificial culture of this fruit.

Mr. Parry, of New Jersey—I am connected with a stock company organized for the growing of cranberries in my State, which for a few years promised to be successful; but of late the plants and fruit have been affected by the scab, so that we feel discouraged. We have so far failed to find a practical remedy for this trouble. We must be careful in the selection of land for cranberry culture. My best success has been in the bottom of an old mill dam, where the ground is always moist. I know of plantations that have been very successful for a long series of years, but these are the exceptions. We very much desire and need information as to the means of checking the scab.

Mr. Stickney, of Wisconsin—The cranberry interest brings into our State yearly from $300,000 to $500,000. Thousands of acres of marsh lands are planted by nature, yielding from 50 to 200 bushels per acre. A good water supply is essential to winter protection, and this should be soft water also. We need a little longer season for the perfection of the berry. Limestone water is death to the plants.

Mr. Augur, of Connecticut—I do not know of a successful plantation on upland.

The President—We will now listen to a paper by F. S. Earle on

FUNGOID DISEASES OF THE STRAWBERRY.

BY F. S. EARLE, OF ILLINOIS.

Like nearly all species of flowering plants, the strawberry furnishes a home to several of those minute forms of vegetation known as fungi. Of

these a portion are true parasites, attacking the green leaves or other parts of the living plant, while others are saprophytes, developing only on such parts as are dead and decaying.

During the last two years I have observed ten kinds of fungi as occurring on strawberry plants in Southern Illinois, and the list can doubtless be considerably increased by farther investigation; but so far only three of them have proved injurious enough to deserve a notice under the head of "Fungoid Diseases."

It may be of interest, as showing the great need of more work in this much neglected but very important branch of study, to note that of the ten species of fungi mentioned above, five, or exactly one-half of them, proved to be new and undescribed. The most important of the injurious species is *Ramularia Tulasnei*, Sacc. This occurs on wild and cultivated plants in all parts of the country, from the New England States to California and Oregon, causing the diseased condition known in different sections as rust, blight or sun scald. In order to distinguish it from the following species I have called this the "white rust." Its presence on the leaf is usually indicated at first by a reddish blotch, and later by a white spot about an eighth of an inch in diameter, surrounded by a reddish border. Under the microscope this spot is seen to be covered by great numbers of minute, oblong cells borne on short stalks. These are the spores, or reproductive bodies, and are capable under favorable conditions of causing the disease to spread very rapidly. On young leaves, in the spring, when the fungus is developing rapidly, this red color does not appear, and the spots look as if scorched by fire. If only a few of these spots are present the leaf does not seem to be much injured, and the general vigor of the plant is unimpaired. The greatest damage is caused when it attacks the calyx and stems of the growing fruit, as it causes them to become dry and shriveled, and the berries, if they mature at all, are small in size, and have a dry, seedy look that is not attractive.

This disease is most active in warm, wet weather, during the period after blooming and before the ripening of the crop, but its effects are most evident when such a season is followed by a long drought during the harvest, as then the diminished leaf surface can not supply sufficient sap to perfect the crop, and the dried fruit stalks prevent its free flow to the ripening berry.

As before stated, this fungus occurs in all parts of the country, yet it only seems to have been injurious enough to attract attention in those sections where large fields of strawberries have been grown continuously in the same neighborhood for a number of years. Other things being equal it causes more damage toward the southern and less toward the northern border of the strawberry belt. With us in Southern Illinois it has for several years past caused very considerable injury, and is one of the worst of the many enemies with which we have to contend. It is, however, very hard to estimate the per cent. of damage caused by it in any given season, as its action is quite local—some fields being badly injured, while others near by are but slightly affected—and, besides, in many cases, losses occasioned by the tar-

nished plant bug (*Ligus lynedaris*) have been reported as caused by rust. Some varieties seem to withstand its attacks much better than others, but none are entirely free from it. This is perhaps largely a question of location, for varieties that succeed nicely in some places are often utter failures in others, on account of this disease. With us, for the last few years, the Wilson has probably suffered more than any other variety in general cultivation. Downing, Cumberland and Captain Jack also rust badly, while, so far, the Crescent has escaped with but little injury. Bidwell is also comparatively free from rust. In many other localities the Wilson is put at the head of the list for hardiness and ability to withstand injury. Mr. J. T. Lovett, of Little Silver, N. J., is of the opinion that varieties having a large share of foreign blood are less liable to rust than those descended from our native stock, and he also observes that some varieties, like Manchester, that succeed well on light, sandy soil, rust badly on heavy, clay land, while others, like Downing and Kentucky, that succeed well on clay, rust badly on sandy soil.

Mr. J. Decker, of Jefferson county, Kentucky, says that light colored berries, such as Downing, Monarch and Cumberland, are more liable to rust than dark colored ones like Wilson and Crescent.

So far as I know, the only remedy that has been proposed for this disease consists in dusting the plants with lime. This has been practiced for some years with good success by Hale Brothers, of Connecticut, and by Mr. Rosaman, of Tennessee. We tried it last spring, in a small way, with apparently good results, and shall repeat the experiment next season. This remedy is so easily and cheaply applied that I hope it will be tried extensively the coming year, and the results reported to this Society. I would advise dusting the plants lightly when the leaves first start in the spring, repeating every two or three weeks till the fruit is nearly matured. Mulching the ground around the plants is also of considerable use in preventing rust. Strips left unmulched across a field are frequently quite red with it, while the adjoining mulched plants are but little affected. The Southern plan of allowing crab grass to grow and fall down among the plants is of advantage in this respect, for plants growing up through such a mulch are almost always clean and bright.

The next species in order of importance is *Glœosporium potentillæ* [Ouds], which I have ealled the "black rust." This has perhaps as wide a geographical range as the last, but so far its injuries have attracted but little attention, or they have been confounded with those caused by the other species. In its first stages it is sometimes difficult to distinguish between this and the white rust, but instead of developing white spots in the center, the reddish blotches show at length a number of very minute black pustules bursting up through the epidermis of the leaf. Under the microscope these are found to contain great numbers of curiously curved two-celled spores. Unlike those of the white rust, these are formed within the structure of the leaf, and they are finally liberated by the rupturing of the pustule. When badly affected the leaves will often turn yellow, and be thickly sprinkled over by

these minute black points. Frequently the plants may have quite a number of leaves in this condition and still remain vigorous, and show very little indication of disease. At other times, however, a peculiar abnormal condition is induced that has been aptly described as the "strawberry yellows" by one of my correspondents. The older leaves die down and lie close to the ground, while the younger ones have a spindling, upright growth, and a peculiar, sickly, yellow color. This condition sometimes appears in newly set fields, during the summer, arresting growth and completely ruining the plants as far as it extends. In bearing fields it usually makes its appearance when the plants first start in the spring, destroying the crop, and often killing the plants outright. Sometimes, however, the plants seem to recover and make a feeble growth later in the season. This disease has proved with us far more destructive than the other, but fortunately it has so far been restricted to somewhat limited areas, and to a few rather tender varieties. It has destroyed considerable fields of Manchester and Great American for us, and compelled us to abandon the culture of these varieties. I have also seen touches of it on Crescent, Sharpless, Minor, and other varieties, but so far it has done them no practical harm.

Early in June I received specimens of Manchester leaves from Mr. Henry Schnell, of Glasgow, Mo., showing the black rust. He reported that it was the only kind showing the disease, and that it did not seem to injure the fruit. About the first of September he wrote again, saying that about one-third of his this spring's planting of Crescents were dying down and making no runners. From the specimens sent I judge that this, too, was a case of the black rust.

Mr. G. Cowing, of Muncie, Ind., reports a peculiar disease, which he estimates has damaged the strawberry crop of his section to the extent of eight or ten per cent. From his description this also seems to be the black rust. He says it is much worse on badly drained land and on varieties with light colored leaves, such as Crescent, Champion, and Bidwell, those with dark foliage, like Wilson, Duncan, and Cumberland, escaping much better. He thinks it worse in newly planted fields, and in those that are very heavily mulched.

From a brief description given by Mr. H. M. Engle, of Marietta, Pa., I judge that this disease is also known in that State, but though, during last summer, I received communications in regard to strawberry diseases from twenty States and Provinces, I received no hint of its occurrence except at the localities just named. I should be glad to hear from the members of this Society, if it has been more widely observed.

I do not know that any remedies have been tried for this disease.

Before leaving the subject of these rust producing fungi, I wish to say that both these forms belong to the class known as incomplete fungi. That is, that they are considered as but the first, or immature forms of species that do not reach their full development till later in the season. So it is quite possible that some of the species referred to at the beginning of this article,

as only occurring on dead and decaying leaves, and therefore not injurious, may prove to be only the continued development of these same rusts. The life history of many of the fungi is exceedingly complicated, and the connection between the different forms that the same species assumes at different stages of its development has only been completely made out in a few limited groups, yet we can not hope to clearly understand their action, nor successfully combat their attacks, till this difficult task is accomplished for all our injurious species. The importance of this study to our agricultural and horticultural interests can not be overestimated, but from the nature of the difficulties to be surmounted it will proceed very slowly in the future as in the past if it is left to the unaided exertions of private students.

The importance of economic entomology is now so well understood that the general government, as well as many of the States, appoint special officers, and provide them with all the necessary aids for prosecuting this study, and we all know that their labors have repaid many times the outlay. Why should not the equally important and far more difficult study of economic fungology receive at least equal recognition and support?

The only species remaining to be considered does not attack the leaves, but forms a white, moldy coating on the roots and crowns, causing them to decay. This coating consists of very delicate white threads, more or less felted together. It is quite difficult to make out their true character under the microscope, as they break to pieces at the slightest touch; but Prof. Burrill, of Champaign, Illinois, well known for his researches in this line of study, has determined them to consist of chains of the minute cells of an undescribed species of *Bacillus*. This genus includes a number of the most destructive of those lowest forms of vegetable life popularly known as Bacteria. It has long been known that many of the most fatal diseases of man and the domestic animals are caused by these minute organisms, but Prof. Burrill, in his able investigations of the causes of pear blight, was the first to demonstrate that they also cause diseases of plants, and we see in this root rot of the strawberry another instance of the same kind. It occurs quite frequently in Southern Illinois, especially in old neglected fields, and together with the crown borer and the root worm, does much to prevent the profitable keeping over of plantations for more than one or two crops. This disease has been observed in Kentucky by both Mr. Decker and Mr. Samuels, but has not been reported by any of my other correspondents. So far as I know no remedies have been tried for it, but it would be a wise precaution in setting new fields to use plants that are known to be free from it.

In closing these hasty notes, I wish again to call the attention of the Society to the importance of securing some provision for the systematic study of the fungi and their relations to our agricultural and horticultural interests. This could perhaps be brought about through the instrumentality of the Department of Agriculture, and, in fact, a beginning has already been made in this direction, as is shown by the carefully prepared series of water color drawings of fungi in the exhibit of that Department in the Government Building.

If the measure for establishing experiment stations in the different States, that was advocated by this Society at its meeting here two years ago, should become a law, then this subject could receive the attention due to its importance by employing a competent person at each station to collect material and make experiments under the direction of a central office, connected with the Department of Agriculture if you please, that should be provided with a complete library and all the apparatus necessary for the most thorough investigation.

Prof. Riley, the entomologist of the Department of Agriculture, has created a very similar system for conducting his researches, having his assistants located in different parts of the country.

Such an organization as is here briefly outlined once established, and we could hope in time for results that would be of the greatest importance to all the material interests of the country.

DISCUSSION ON MR. EARLE'S PAPER.

Mr. Williams, of New Jersey—What effect has the leaf rust on the berries?

F. S. Earle, of Illinois—The rust on the plant seriously affects the berry; the fruit on such plants being small and seedy.

Mr. McClave, of Michigan—Is the red rust on the raspberry and blackberry the same as that affecting the strawberry?

F. S. Earle—No; entirely different. But few reports from Michigan mention the strawberry rust. The strawberry growers of Southern Illinois seem to suffer most from the rust.

Mr. Caywood, of New York—Is it more common in wet weather?

F. S. Earle—It is worse in dry weather.

Mr. Kellogg, of Wisconsin—Do you use one, two or five bushels of lime to the acre?

F. S. Earle—No; probably not over one half a bushel.

Dr. Hape, of Georgia—Have you tried ashes?

Mr. Earle—Yes; but can not say as to its efficiency.

Dr. Hape—The Sharpless is one of the few varieties not attacked by the rust with us.

Mr. Pierce, of Ohio—I have known the black rust very abundant on a field where ashes had been liberally used as a manure. The roots had decayed in spots. Black rust probably begins under ground.

Dr. McKay, of Mississippi—We have not been seriously troubled with rust. The plants of a few varieties have suffered, but I have noticed no damage to the fruit. I have checked it in some instances by the use of salt. In another case kainit stopped it quicker than salt, but we have not experimented much.

F. S. Earle—How do you apply salt without injury to the plants?

Dr. McKay—We are careful to not let it come in contact with the foliage of the plants.

Mr. Augur—Have you tried lime mixed with sulphur?

F. S. Earle—No; have experimented but little, as stated above.

Mr. Smith, of Wisconsin—Don't rust appear most on weak plants or over-cropped areas?

F. S. Earle—No; rankest ones most attacked. This is true of most varieties.

Mr. Smith—Have you noticed plants to die after heavy crops?

F. S. Earle—Have not. Our plants are cautious about overbearing.

Mr. Caywood—Our plan is to apply a teaspoonful of sulphur under each plant. It keeps grubs away and the plants healthy. Have had no rust on plants thus treated.

F. S. Earle—The white rust is more general, and more injurious on that account. But when black rust attacks it is the most fatal.

Mr. Roe, of Wisconsin—Rust first appeared in Wisconsin during the wet summer of 1883. The Wilson, Bidwell and, I think, the Crescent, were first attacked. Manchester suffered no more than Wilson. A worse difficulty with us is the leaf roller.

Mr. Hollister, of Missouri—When plants die after full crops it indicates a need of invigoration.

Mr. Smith—I can tell, no matter what the weather is, whether a heavily cropped bed will live or not. If the leaves lop down, no new runners formed, no new leaves, no strength in the leaf stem, we know at once it will not pay to keep them. Heavy bearing is certainly a prolific cause of rust.

F. S. Earle—We see the confusion resulting from the use of popular names; I spoke specially of white rust. You are probably too far north to suffer from the latter in Wisconsin.

Dr. Jewett, of Ohio—The effects of fungi is a profitable subject for our consideration. Great numbers of diseases of plants arise from the presence of fungi. Lime is a good general remedy for such diseases. A better remedy, but more expensive and difficult of application, is carbolic acid. I have applied it to pear blight and grape rot, apparently checking both diseases, one-half ounce to three gallons of water sprayed over the trees being sufficient.

F. S. Earle—Don't it burn the foliage?

Dr. Jewett—Not if properly mixed.

F. S. Earle—If pretty well mixed it accumulates in globules by evaporation of water, and burns, but we can not predicate a general usefulness of such a remedy from its success in a single case.

Mr. Stoner, of Louisiana—I have removed to new situations plants from diseased beds, but never have had them to recover.

F. S. Earle—In black rust this is probably always true; in other cases I think they can be removed.

Mr. Augur—Would it not be well to mow off rusted foliage and allow a new growth?

F. S. Earle—Probably, though I have had no experience.

Mr. Beatty, of Kentucky—We suffer much from fungoid disease of the foliage. We must change to new ground after one crop. We have had to discard the Capt. Jack and others of its class. Charles Downing is our best variety.

Mr. Roe—The leaf roller gives us a world of bother. We are in pursuit of a remedy for this pest. Plowing under after the fruit is gone is our best remedy.

Mr. Smith—I sprinkle in August with Paris Green in water, and in spring, soon after the first blossoms appear. I use a large teaspoonful to the pail of water. Have had no bother from the leaf roller since.

President Earle—We will now have a paper from Mr. Hollister, a well-known commission man and fruit dealer of St. Louis:

FRATERNITY.

BY E. T. HOLLISTER, OF MISSOURI.

At our last meeting our Secretary mentioned the fact of having received a letter from some person, asking if there was any danger of any faction or clique taking possession of and running the meeting of this Association, and that remark suggested the propriety of offering a few suggestions upon the subject of fraternity.

Some will decline to attend a meeting of this kind because they believe it to have been gotten up in the interest of the nursery men. Others for fear the commission merchants will take advantage of it to make business for themselves. Others because they fear that the box maker, evaporator, dealer, cider mill man, seed dealer, or some other person not a fruit or vegetable producer, may desire some benefit from the meeting.

We are all of us more or less dependant upon each other; and the common carrier, nurseryman, seed dealer, commission merchant, newspaper man, box maker, evaporator man, tool or implement maker, are as necessary to the success of the horticulturist as the soil upon which he grows his fruit and vegetables, and are all entitled to an equal representation in a gathering of this kind.

The nurseryman is a most important personage, and should always be found among us, for he is the one who plants the seed and produces the tree or plant from which we realize our income, and it is he who, by a strict attention to his business, by experiments, cross-fertilization, etc., is constantly producing new varieties, many of which prove more valuable than anything we have previously known. It is to him we are indebted for the high position assumed by the horticulturist, and by participating in our debates, learning the wants of the people from the experience of the producer, dealer and consumer, is better prepared to supply the varieties most in demand, and to advise beginners as to what will be the most remunerative to them, and the best adapted to their soil, climate and location; and it is to him we should bow the bared head whenever he appears among us, for he is entitled to our reverence and respect.

The seedsman is an indispensable personage, and one we could not very conveniently get along without, for he is the one who gathers together, from all parts of the world, the seeds, bulbs, plants, etc., so necessary to every one in our line of business, placing them all within our reach at a cost much less than would be possible for us to procure them for ourselves, very greatly facilitating our operations and increasing our profits, and, notwithstanding the fact that he, like all the rest of us, prosecutes his business, not because of his philanthropy, but for the profit there is in it, to which you will all agree he is justly entitled, should always receive the hand of fellowship, and be welcomed to a prominent position in our midst.

What would become of your products without the aid of the common carrier, who gathers them up at the various stations along the line of its route

and places them quickly upon the market in the great commercial centers or distributing points, where it is almost absolutely necessary for them to go to find purchasers, and where, after having been divided into lots to suit the demands of the various sections of country, they are delivered to other common carriers to be distributed among the hundreds of stations all over the country, which they could never reach but for the facilities offered by the transportation companies?

The more of the agents of these companies we can induce to take part in our deliberations, the better will they understand the importance of the horticultural interests of the country, and the better facilities will they give us for placing our products upon the various markets.

A very important factor that assists to make up the great horticultural whole is the commission merchant, who locates himself in the markets to which the country naturally looks for its supply, makes himself acquainted with the wants of the people, visits all sections of the country likely to want anything in your line, which is done at no small outlay of means, and is at all times prepared to take care of your goods in a manner that would be impossible to yourselves, and at a very much less expense to the shipper, and, acting in the capacity of your clerk or agent, is entitled to your confidence, and should be consulted upon all matters in which you are mutually interested, especially those matters upon which you are not fully advised, as he, coming in contact with the purchaser and consumer, is prepared to advise you as to their wants, and to furnish you with reliable information you could not otherwise obtain.

Who will say that we are not all dependent upon the box and basket maker, and what would we do with our products without him, and why should we object to his exhibiting samples of his wares at our meetings, so that we may, by comparison, select that which is the best adapted to our purposes, and learn where, from whom and at what price we may procure them? By attending the meetings of this Society, where he meets practical people from all parts of the country, he learns the wants of the different markets, and is better prepared to supply each section with the kind of package required, thus facilitating the transportation and sale of our goods, and increasing our revenues.

The evaporator and cider mill afford us facilities for disposing of a large portion of our crop that would otherwise be wasted, enable us to place a better grade of fruit upon the market, prevent the gluts that often occur from the shipment of a great quantity of low grade goods, and assist us to more remunerative prices; and those who deal in them should always be welcomed to our meetings and receive courteous treatment.

Be not afraid to meet the patent right man who comes to exhibit the product of his fertile brain. Every one who can produce a package that will carry your products to market so as to realize the most profit to you, or who may invent a tool or implement which will enable you to produce the best results with the least expenditure of money or labor, which is often done at

a vast expenditure of means and years of patient labor in his endeavors to perfect the article he is trying to produce, is a benefactor and is entitled to a place in our midst.

Last, although not least in importance, I will mention the newspaper man, who comes armed with paper and pencil, makes notes of the most important features of our debates, so that, through the columns of his paper, millions of people, who are not so situated as to be able to meet with us, may be informed of our actions and benefited by our discussions. He is, indeed, a great benefactor, and should receive our hearty, moral, as well as pecuniary, support.

Fraternity is the vital factor of a society of this kind, and unless every person who is in any way interested in the production, transportation, sale or consumption of fruits or vegetables can meet upon equal footing and receive equally courteous attention, the object of this Society has not been attained, and, it may be truly said, that it has fallen into the hands of a clique. Such, I am happy to say, has not been its history in the past, and I predict will not be in the future. Its meetings have always been conducted upon the broad gauge plan of fraternity; people from all sections of the country and of all lines of business have been received with open hands and courteous treatment, and invariably return to their homes feeling that they had been benefited by its fraternal associations, and impatient for the time to arrive for its next meeting.

President Earle—The programme of to-morrow forenoon will consist of a paper by Mr. Merwin, of Tennessee, on Fertilization, election of officers, etc.

The Society then adjourned till 9 A. M. to-morrow.

Third Day—Friday.

FORENOON SESSION, January 16.

At 9:30 A. M. President Earle called the meeting to order, and introduced Mr. C. M. Merwin, of Tennessee, who read his paper on

FERTILIZATION OF THE STRAWBERRY.

BY C. M. MERWIN, OF TENNESSEE.

MR. PRESIDENT—I was notified by the Secretary that a paper on the pollenization of the strawberry was expected of me at this meeting, and I have prepared such as best I could, and hope that, should discussion follow,

we may gather from the experience of growers more light on this subject. This question of influence of the pollen of one variety upon another is an important one; that is, if a pistillate variety can be increased in size, improved in flavor, firmness, and other desirable qualities, it is important that we should know it. Until within a few years each variety of strawberry was supposed to have its special characteristics, as form, color, etc. But now we hear growers speak of pistillate sorts (the Crescent, for instance) as being of large size when fertilized by the Sharpless, dark colored and firm when fertilized by the Wilson, and so on. Now I take the position, Mr. President, (though I am aware that many old, experienced growers hold to opinions on this subject contrary to mine, and I admit that some experiments made in this direction, notably those by Prof. Lazenby, are rather convincing), that a pistillate variety is not changed to any perceptible degree by the pollen of another variety.

Now, it is a well known fact that any variety will vary when planted on different soils and in different localities; that is, will not give the same results everywhere. As, for instance, the Crescent as grown in Southern Illinois is not as firm nor as dark colored as the Crescents grown in West Tennessee. The color and firmness of the West Tennessee Crescents so nearly resemble that of the Wilson that they are often sold in the markets for the Wilson, and some of our growers claim that this has been brought about by the influence of the Wilson. Now, if Southern Illinois growers used a soft, light colored variety to fertilize their Crescents with, and West Tennessee used only the Wilson, the proof would be strong that it was from this cause that the variety differed so in the two localities; but such is not the case. The Wilson is used in Illinois as a fertilizer for the Crescent as much as in Tennessee, hence we must find some other cause, and, in my opinion, it will be found in the soil.

Some of the finest Crescents I have ever seen were fertilized with the Crystal City, a rather small, soft variety; and as large, fine Crescents as were grown at Gadsden the past season, where several hundred acres of this variety were cultivated, were grown by Mr. Rains in a field fertilized with what he called a bogus variety. The drought of 1881 destroyed his Wilson plants and he ordered more from the North, but received this variety instead, a very small, sour variety, not worth picking, but having an abundance of pollen, and blooming with the Crescents.

I made a little tour of observation, near the close of the berry season, among the growers at several stations around me, on purpose to see this change in the Crescent that I had so often heard about, but in no instance could I find a Sharpless or other variety than Crescent growing on Crescent plants. There was some variation in the different patches, but in no case could it be traced to the variety furnishing the pollen.

I also visited the strawberry section of Southern Illinois and was present at the strawberry exhibition at Cobden. I found growers there divided upon this question; some old, experienced growers were very positive in their

opinion that the variety furnishing the pollen did impart its own characteristics. There were on exhibition Crescents that had been fertilized by about a dozen varieties, and there was considerable difference in the appearance, but there was also a marked difference between those grown by different growers but fertilized with the same. Here would be a plate of Crescents of large size, some inclined to Coxcomb shape. I inquired what variety was used as a fertilizer. "Why, the Sharpless, of course; can't you see the resemblance? and here, taste one. Sharpless in flavor, ain't it?" "Yes," I reply, "that tastes and looks like a Sharpless." I cross the hall and find on the table another plate, in appearance just like the other. "Now," I thought, "if these were fertilized by Sharpless there may be something in this new theory;" but the grower informed me that the Crystal City furnished the pollen, and if I remember right, Mr. President, I saw at four of your packing houses Crescents that had been fertilized with as many different varieties, and there was no perceptible difference in them.

As proof of this theory we are cited to the fact that Indian corn will mix; so it will, and exactly in the same manner as the strawberry, through the seed; but the seed is not the fruit. The pulp of the strawberry bears the same relation to the seed as the cob does to the kernels or seed of the corn; each is what nature intended, a receptacle for the seed. A row of sweet corn planted in a field of ordinary corn, if in tassel at the same time, would probably receive the greater part of the pollen, necessary to fructification, from the field corn, for the reason that the stamens are located at a distance from the pistils, the wind carries the pollen away and brings the pollen from other plants to this row, hence the corn is changed but the receptacle remains the same. The ear may be larger because the grains are larger, but the same number of rows and the same number of grains in each row as there would have been had there been no field corn within a hundred miles of it. If an eight-rowed variety, not an ear will be found on that row with more, though all the rest of the field may have fourteen or sixteen. It must be so, for a seed or grain was formed in embryo at the base of each pistil or silk without regard to the variety growing around it, and no one would claim that the field corn could have any influence upon this row before the silk and tassel were visible, and certainly nature will not then add more silks to the one to accommodate the other; neither will the cob be changed in color, and I have no doubt that the flavor would be unchanged, though I have never eaten many cobs and could not be positive about that.

It is also claimed that melons, squashes and cucumbers will so mix and mingle in the process of cross-fertilization, that squashes will be found upon cucumber vines and cucumbers upon melon vines; but they have never grown in that manner with me. I planted the past season cucumbers in my Japan melon patch, and melons among my cucumbers, and in gathering cucumbers for pickles I found it was a waste of time to look for them on the melon vines, and I was not able to detect any cucumber flavor in the melons. Now, I have no doubt that the character of the seed was changed

and they could not be depended upon for a crop the next season, as there would probably be some variation, and possibly a hybrid would be the result. Some of the members at the meeting at Kansas City in discussing this question stated as their opinion that this change was not all the result of cross-fertilization, but the influence of tree upon tree or plant upon plant, and it is a very common opinion in the South that one variety of sweet potato will partake of the color and quality of another growing near—and a few years ago I half-way believed it, too. I was then growing the Red Hayti with several other varieties, and I would sometimes find among the Southern Queen and Yellow Yams potatoes streaked with red—sometimes half red. I then discarded the Hayti and bought new seed; but I still find among those varieties specimens partly red, and have not grown a red variety on my place for six years. Now I have never seen a streak of red upon a Yellow Jersey, even when grown in the next row to a red variety, and my theory is this: one or both of the parents of the Southern Queen and Yellow Yam were red varieties, while the Jersey is a seedling of yellow parentage having no red blood in it.

If the character of the strawberry is so changed by the process of fertilization, why may we not look for the same results in the peach, the grape, or any of the other fruits; they would be as susceptible of change as the strawberry, and I would think more so, for their seeds have a greater proportionate weight or bulk and it is well known that they all admit of cross-fertilization, and while all of the fruits are not structurally the same, the process of seed development is identical from organs connected closely with the pistil.

Nature prepares the seed in embryo long before the blooming season, and when impregnated is prepared for development. The pollen has performed its work, and neither it or the plant from whence it came can have any further influence upon the growing pulp. If any change is wrought in the color, form, or flavor it must come from the influence of those few tiny seeds in process of development; and I can not see how this could be. Were it so there could be no reliable description given of pistillate varieties, and the descriptive catalogue must necessarily read thus: Crescent, pistillate; size large when fertilized with Sharpless, dark crimson when fertilized with the Wilson; a good shipper when fertilized with Sucker State; early or late, sweet or sour, according to season and degree of acidity of the variety furnishing the pollen. Now I have read the description of the Crescent as given by most all of the prominent nurserymen of our country from its introduction down to the present time, and they have been as nearly alike as the description of any self-fertilizing sort.

I think, Mr. President, there is a good deal of imagination in this matter. To illustrate: if a gentleman here should be pointed out to me as your brother, I would probably at once discover a resemblance between yourself and him, while had I not been informed of the relationship I would have passed him a hundred times without noticing the resemblance, unless it was a very marked one. So it is that if a plate of berries be pointed out to us as

Crescents fertilized with Sharpless we can at once see a resemblance, but of all the Crescents I have ever seen it would have been mere guesswork to have attempted to tell what variety furnished the pollen.

If this theory is correct I hope to be convinced of it before planting time, as it is my intention now to plant Crystal City with the Crescent. But I don't want to reduce the size of the Crescent, for it is none too large, so would change my plans, as, if the Sharpless increases the size, the Crystal City, being small, would as certainly diminish it.

I shall be glad to hear the experience and opinions of others at this meeting.

Following which, Hon. Wm. Parry, of New Jersey, read a paper on Cross-Fertilization:

CROSS-FERTILIZATION.

BY WM. PARRY, OF NEW JERSEY.

The system of artificial cross-fertilization usually adopted in producing new varieties of fruits, which, although attended with much labor and close attention, and requiring a knowledge of botany not always possessed by farmers and fruit growers, is very uncertain in its results, requiring several years of patient watching, nursing, and tilling the young seedling before any indications are shown as to whether the offspring will be either better or worse than the parentage from which it was produced. It has been said by good authority that, after all this nice work, and waiting and watching, happy is the man who gets one prize to a thousand blanks; and is it any wonder, when we reflect how apt the pistil of the flower operated on is to be mutilated and permanently injured by cutting away the stamens around it with an unsteady hand, and then taking pollen from the flower of a favorite tree or plant and applying it to the stigma of the blossom thus denuded of stamens, without knowing whether there existed any congeniality or liking for each other between the pollen or stigma? Forced connections, contrary to nature, seldom produce happy results. Man has not yet invented instruments with magnifying power sufficient to reveal all the mysteries of nature; and what is there more difficult of comprehension than the existence of all circumstances in the right quantities and at the right time and place to produce the best results not only in creating life, but such a life as will grow into a plant or tree and produce fruits superior to others of its class? That is beyond our power. We know that an acorn put into the ground will, in time, become a large tree, but the *cause* of the necessary transformation that must take place we know not, any more than we know the *cause* of gravity which holds the heavenly bodies in their sphere. Better leave those mysteries which we can not understand to a higher power, who comprehends and does all things for the best, and we make use of the means

so abundant within our reach of selecting the seed that will give new and improved varieties of fruits in the natural way, more certain and satisfactory than the unnatural, artificial mode of impregnation.

For the want of closer observation on the part of our ancestors, it has been reserved for the present generation to discover and make known the fact which had always existed, though not observed, that the size, flavor, texture and general appearance of strawberries grown on pistillate plants will resemble those grown on the hermaphrodite plants that produce the pollen which impregnated the pistillate sorts. And that this principle applies not only to pistillate varieties, like Manchester, Crescent and others, but also perfect flowering varieties, like Wilsons and Sharpless grown together, give larger, more irregular and better flavored Wilsons than when grown alone, while the Sharpless were darker in color, firmer and more acid than when alone. Here, then, we have cross-fertilization in the natural way, and we are sure that seedlings grown from them will be cross-bred, partaking somewhat of the characteristics of both parents, but when cross-fertilization has been performed artificially we are not sure that the offspring is cross-bred, especially if there is no perceptible change in flesh or pulp of the fruit producing the seed. Some people may think their pet seedlings are cross-bred, because they tried to have them so, when in reality they are not. The effect of this natural crossing is visible on the fruit before it is gathered, and we know just which berries to select for seed to get the benefit of the cross. May not this principle apply to all fruits and flowers that produce pollen for the impregnation of their own or the pistils of other flowers. It has long been recognized with regard to vine "truck." It is well known that squashes, cantaloupes and cucumbers planted near together will mix and amalgamate so as to destroy the appearance and good qualities of each other. A grain of red corn in a field of another color will impress its character on the surrounding hills as far as the pollen extends. The value of a patch of watermelons may be entirely destroyed by the admixture of pumpkin or preserving citron seed.

We once had a field of watermelons with some missing hills that needed replanting. Not having seed of our own, we procured some of a neighbor who, ever ready to do a good turn, furnished them without charge, which, upon trial, were dear enough, as they produced preserving citrons, the pollen of which contaminated the whole field. The melons grew finely and were very tempting to travelers passing by. One day an old acquaintance living in the village a few miles off, who expected to have a company of his friends to dine with him the next day, happened to be passing along in his carriage. Seeing an abundance of fine looking melons within convenient reach, and thinking they might help out with the entertainment, and that he was well enough acquainted to help himself without further ceremony, he did so, and took home with him a few nice looking melons. Next day, when he and invited friends were comfortably seated around the table, those fine looking melons were brought in with a carving knife by side of them.

He took hold of the knife and endeavored to dissect them, but finding it more difficult than he expected, and as he was not the man to be baffled over a watermelon, he put on more power and forced the blade through and turned open a preserving citron to the full view of his surprised guests. It had a good effect, in teaching him never to take watermelons, however plenty they might be, without consulting the owner.

Here, then, we have evidence incontrovertibly establishing the fact that natural impregnation does affect the pulp or flesh of fruit so treated, as well as the seed, and that we have a sure indication when the seed have been influenced by the cross merely by inspecting and tasting the fruit, when we are not sure that the seed are affected by artificial impregnation unless the effect of the cross is manifested in the pulp or flesh of the fruit. Thus we want knowledge, experimental knowledge, which is best of all; hence the importance of establishing agricultural experiment stations throughout all the States, that all things may be tried and the best retained.

Take a grain of wheat and one of barley, examine them, and is there a chemist in the land who can tell, by analysis, which should be planted in the fall and which in spring? Or have we magnifying glasses of sufficient power to determine whether a certain tree or plant will produce pollen the best adapted to impregnate the pistils of the flowers on the tree or plant which stands nearest? We have found out by experiment that the Sharpless and Wilson strawberry do produce pollen congenial to each other, and especially to the Manchester and Crescent strawberry. Also that the Hautbois strawberry does not cross readily with any of our common varieties. Here then we have a wide field open for experiment; let every fruit grower carefully note his own observations and report them annually to this Society, whose influence extends over the whole continent. About the year 1878, when planting an orchard of standard Kieffer pear trees, we set a few dwarf Bartlett trees among them, thinking that would be a favorable plan for having the blossoms on the low-growing Bartlett trees impregnated with the pollen falling from the taller standard Kieffer trees in the natural way. My intention was to plant the seed of the Bartletts thus subjected to copious showers of pollen falling from the Kieffers, and await the result of the new seedlings grown therefrom. But last year we noticed some of the Bartletts had the shape and outward appearance of Kieffer pears, and hung on the trees about one month later than other Bartletts grown here, and attained a larger size, measuring 10⅛ inches around crosswise by 11½ around lengthwise; flavor and quality of flesh and color of skin like the Bartlett; size and shape of fruit and time of ripening more corresponding with the Kieffer.

Another illustration of the same principle: Last winter Charles Parry, who lives adjoining us, removed a standard Bartlett pear tree, which had borne fruit for several years, to make room for moving his barn. The Bartlett tree thus removed was planted close by and nearly between two large standard Kieffer pear trees. All three bloomed profusely, and bore an abundance of fruit very similar in outward appearance to Kieffers.

The Bartlett fruit was mostly double turbinate, pointed at both ends like Kieffers, yet when cut open had the natural Bartlett taste. The Bartlett tree having been recently moved, which checked its growth and weakened its reproductive powers, there was not strength and vigor enough to produce a sufficient supply of pollen to impregnate the pistils of the Bartlett blossoms, and they were in a suitable passive state to receive pollen from the more vigorous Kieffer trees near by, which furnished an abundant supply for themselves and the Bartletts also. There were but few seed in the crossed pears—some had none, and others were defective. We have carefully planted the seed taken from these supposed crosses which showed a marked change in outward appearance, hoping some of the offspring may produce fruit equal, if not superior, to that from which the seed was taken; and if we get a new seedling pear, or an improved Bartlett, larger in size, of the same quality, and three to four weeks later in ripening than its female parent, the Bartlett, crossed with the Kieffer, it will be of some value to fruit growers who have no retarding house to keep back their Bartletts.

In 1840 we planted a new pear orchard of 312 varieties; some of them have done well, others not, and have been regrafted with Kieffers and Le Contes. There was one row of Lawrence through the orchard that has always borne well of excellent fruit and usual size. Several trees, which were of but little value, in the row next to the Lawrence were top-grafted with Le Conte about five years since, and last year (1884) bore abundantly of large, handsome fruit, and produced pollen sufficient to impregnate some blossoms on the nearest Lawrence trees, so that the Lawrence pears thus cross-fertilized in the natural way grew much larger than usual and were about equal to the Le Conte in size, measuring 10 inches around crosswise and 11⅞ around lengthwise.

We have grafted the Bartlett in the tops of Kieffer pear trees, also Kieffer and Le Conte in the tops of Seckel pear trees, so as to bring the blossoms close to each other, the most favorable position for cross-fertilization in the natural way. We have also grafted the Lawson, a most beautiful early pear, ripening in July, of medium size and quality, in the tops of Manning's Elizabeth, a smaller pear of excellent quality, ripening nearly at the same time. If we can, by this system of cross-fertilization, obtain a new variety, combining the size and great beauty of the Lawson with the delicious quality of the Elizabeth, it will be an acquisition well worth the care and attention necessary to accomplish so desirable an object.

Twenty years ago, when reading the works of Van Mons and others on originating new varieties of pears, I thought I was too old to plant pear seeds with any prospect of seeing the fruit grown from them. But, about five years since, that eminent friend of pomology, Charles Downing, sent us some choice pear seed, stating he thought we would like to plant them; and we now have in our lawn a strong, vigorous tree ten feet high, grown from them. It bore last summer twenty-five pears; when about half grown thirteen were removed, as we thought one dozen were enough for a tree five years

from seed to ripen. Those pears are in fine condition now, measure from nine to ten inches around, and look as though they would keep sound for a month or two more.

If, then, we can distinguish from the outward appearance of pears those upon which the cross-fertilization has taken effect, and from the seed of those thus crossed can produce full grown pears in five years, it seems to bring the production of new varieties very much within our control. Let us all then lend a hand to the good work and endeavor to produce just such pears as we desire.

DISCUSSION ON FERTILIZATION.

Mr. Alwood, of Ohio—The result of our investigation, at the Ohio Experiment Station, convinces us that there is something more than mere theory in this matter. The flowers of the Crescent fertilized by pollen of various staminate varieties produce fruit more or less partaking of the character of the staminate variety. To prove that our work has been thorough, we have isolated flowers of the Crescent in the same manner as those fertilized by staminate varieties, and they have invariably failed to produce fruit. We have thus satisfied ourselves that the artificially fertilized flowers are thoroughly influenced by the staminate variety used. The results of this careful work prove clearly that the fruit reflects the character of the male parent.

Mr. Pierce, of Ohio—Watermelons are certainly affected by the near proximity of squashes. An instance where watermelons were grown near Hubbard squashes thoroughly proves this. To prove that it was not from the mixture of seed of a previous year's growth, old seed were used which were known to be pure, yet the result was as stated.

Mr. Caywood, of New York—In promiscuous fertilization we get natural crosses when varieties are grown within reach of the pollenizing influence. In art fertilization we know we will get in some respects what we aim at. The question now is, whether we get immediate results in the current crop of fruit or whether the results are only recognizable in the offspring.

Mr. Merwin, of Tennessee—Judge Parry mentions red corn. I agree that corn is affected by the character of the pollen by which it is fertilized. But this is hardly a fair illustration, as the corn itself (the grain) corresponds to the seed of the strawberry, while

the cob is that portion which corresponds to the fleshy portion of the strawberry. In botany the strawberry is merely the receptacle on which the true fruit (the seed) are located. How the process of fertilization can materially change this receptacle is more than I can understand.

Mr. Durand, of Missouri—Did you ever plant pop corn with small cobs among large cobbed varieties; and was not the size of the cob increased?

Mr. Merwin—I have not noticed the color of the cob changed from white to red, or the reverse.

Mr. Augur, of Connecticut—We must accept positive evidence in candor and without prejudice. Some of us Connecticut farmers visited a gentleman's melon patch. The melons, though fine looking, were poor in quality. He explained by saying, "I planted citrons near my melons and they have spoiled them." He did not certainly know that the melon seeds were pure, but he thought they were. Prof. Beal stated to me, in a letter, that he was convinced that the influence of cross-fertilization might be at once visible in the fruit.

Mr. Ohmer, of Ohio—In justice to Prof. Lazenby, of the Ohio Experiment Station, I will say that his experiments have been made with great accuracy. He says he could recognize crosses of the Crescent at once, and that he was enabled to tell by what variety it was fertilized. I visited him and saw enough to convince me there was much truth in his assertions.

Mr. Munson, of Texas—It seems to me desirable that the experimenter should know exactly the botanical structures, and should tell us just how much and what parts of the fruit are affected by cross-fertilization. The receptacle of the strawberry and the cob of corn are not identical in structure or morphology. In animals, blood will continue to assert itself for several generations following a cross. In the apple the case differs from that of the strawberry. We might not recognize effects in the apple even if we could in the strawberry, because the parts we call fruit are morphologically different.

Mr. J. C. Evans, of Missouri—From the Committee on Excursions, reported recommending that the Society go to Shell Beach on

Lake Borgne on Monday next. The train will leave the Shell Beach depot at 9:30 A. M.

Mr. Earle, of Illinois—In this excursion we will pass some of the most interesting sugar plantations in the State. The sugar industry just now is very much depressed owing to low prices, and vegetable gardening for Northern markets is being looked to, as these lands are admirably adapted to the production of early vegetables.

CHANGE OF THE NAME OF THE SOCIETY—DISCUSSION ON.

Mr. Munson, of Texas—We need more members to enable our Society to carry forward the work in which it is engaged. I am satisfied that its affairs have been conducted economically, yet we have not been able, from the receipts from the fees of members, in the past, to publish and distribute our valuable reports without running annually behind. The work our Society is engaged in is too valuable to be thus crippled. Can we not adopt a system of life membership which will help us out in this matter? I am willing to lead with a fee of $25 for life membership.

Dr. Hape, of Georgia—The name of our Society is too limited. We in reality represent the whole country; why not change our name to correspond with our work? I move the appointment of a committee of seven to consider this matter and report.

Mr. Campbell, of Ohio—I move to amend by referring the matter by direct vote to the Society and change the name to the American Horticultural Society.

Mr. Caywood, of New York—How will this affect the American Pomological Society?

Dr. Hape—I am a member of that society and proud of it. I do not see that the society occupies the same field. The American Pomological Society is less comprehensible than ours. I see nothing in the proposed change to mar the advancement of either.

Mr. Caywood—I think the gentleman is mistaken; there is a conflict. One must take the place of the other.

Mr. Augur, of Connecticut—I think neither need conflict with the other. I indorse the proposed change.

Mr. Lyon, of Michigan—I am a member of the American Pomo-

logical Society. At Rochester the motion to make it the American Horticultural Society failed. It was claimed that its field was already broad enough. Have never noticed any antagonism between the societies. I think this Society should take a name corresponding to its scope. We should be in name as in fact a national society.

Mr. Roe, of Wisconsin—There is a growing sympathy, a coming together of sections throughout the continent. When we make it the American Horticultural Society they can all feel an interest in us.

Mr. Smith, of Wisconsin—I indorse the proposed change. I am a member of the American Pomological Society, and, as an individual, do not feel any fear of jealousy or conflict of interests between the two organizations.

Mr. Munson—I fully believe that the change contemplated will add greatly to the interest of both organizations.

Mr. Parry, of New Jersey—Being a member of the American Pomological Society, I would also love to be a member of the American Horticultural Society.

Mr. Wilcox, of California—I can pledge the hearty support of the California horticulturists.

Mr. Grimes, of Colorado—I am one of the few members of the American Pomological Society in our State. I also want to be a member of the American Horticultural Society.

Mr. Van Deman, of Kansas—Kansas horticulturists will approve the change.

Mr. Williams, of New Jersey—As one of the warmest friends of the American Pomological Society, I can heartily approve of the proposed change.

Mr. Babcock, of Arkansas—As one of the original members of this Society, I most heartily approve of the change. I do this as a member of the American Pomological Society, and without fear of jealousy or conflict of interest.

A number of other members participated in this discussion, with one exception *all* favoring the proposed change. After which the motion was put and carried unanimously.

President Earle—We are now the American Horticultural Society.

ELECTION OF OFFICERS.

On motion of Hon. J. M. Smith, of Wisconsin, the Society went into an election of officers, resulting as follows:

President—Parker Earle, of Illinois.

First Vice-President—T. V. Munson, of Texas.

Secretary—W. H. Ragan, of Indiana.

Treasurer—J. C. Evans, of Missouri.

On motion of Geo. H. Wright, of Iowa, amended by L. B. Pierce, of Ohio, the following committee of seven was appointed to nominate the several State Vice-Presidents: Geo. H. Wright, of Iowa; W. H. Ragan, of Indiana; J. C. Evans, of Missouri; E. Williams, of New Jersey; N. Ohmer, of Ohio; I. Wilcox, of California; Dr. Samuel Hape, of Georgia.

On motion of Mr. Robinson, of Kansas, the delegates from each State were requested to report to the above named committee the names of suitable persons for their respective State Vice-Presidents.

An invitation was accepted from the Dairyman's Association to meet with that body at its opening exercises in the Dairyman's Department of the Exhibition at 2 P. M. to-morrow.

On motion, the Society adjourned to meet at 2 P. M.

Third Day—Friday.

AFTERNOON SESSION.

The Committee on Nominations of Vice-Presidents reported. (See list of Vice-Presidents.)

Mr. Beatty, of Kentucky, presented the claims of the Louisville Exposition in the following resolutions:

WHEREAS, Upon our large agricultural, horticultural, mineral, live-stock, and timber interest the country's progress largely depends, and the development of these interests can and should be materially promoted by competitive displays; and,

WHEREAS, The people of Louisville, Kentucky, have by private contributions prepared extensive buildings and grounds suitable for the purpose in view, and propose to hold therein a national agricultural, horticultural, mineral, timber, and live-stock exhibition, illustrating the agricultural and horticultural features and natural resources of America; and,

WHEREAS, It is desirable to aid and encourage an enterprise so beneficial to the people at large; therefore,

Be it Resolved by the American Horticultural Society, now in session at New Orleans, La., this 16th day of January, 1885, that this Association approves the plan for such an exhibition set forth in the prospectus of the Southern Exposition at Louisville, Ky., dated October 23, 1884, and signed by the general committee of said company, and the bill in Congress to encourage the holding of said exhibition, introduced by the Hon. A. S. Willis of the House of Representatives, and hereby memorializes Congress to enact said bill and make the appropriations therein stated, with such regulations in regard thereto as Congress may in its wisdom deem just and proper; and,

Be it further Resolved, That this Association extends to said enterprise its cordial support, and hereby offers to cooperate with the managers of the same in making the proposed exhibition a complete and full illustration of the horticultural interest and industries of America.

On motion of Dr. Hape the resolutions were referred to a committee of five for further consideration.

Dr. C. V. Riley, U. S. Entomologist, Washington, D. C., was then introduced and delivered an interesting verbal address on

INSECTS OF INTEREST TO FRUIT GROWERS,

WITH SUGGESTIONS FOR COOPERATION IN FURTHER STUDY AND EXPERIMENT WITH THEM.

[Prof. Riley's address created intense interest because of the many important practical suggestions which it contained. But it was verbal, and to a large extent an explanation of appliances brought for exhibition. The report of his remarks is therefore necessarily incomplete, and I regret that he has been unable, for want of time, to prepare the report himself.—SECRETARY.]

Dr. Riley said: The recent method of evaporating the oil of tobacco is a most useful mode of using it, where it can be so used. Mere strewing of stems on the ground, where the ground is periodically moistened, is sufficient to destroy many insect pests.

Three substances are more practically useful as insecticides — arsenic, pyrethrum and petroleum.

Arsenic is dangerous when used for protecting fruits. He felt averse to recommending it except where there was perfect safety.

Passing by pyrethrum, which is limited in its usefulness, he treated of

kerosene emulsions, and in the course of his remarks read the following from the advance sheets of his forthcoming report:

"It can not be too strongly impressed upon all who use kerosene as an insecticide, that it can be considered a safe remedy only when properly emulsified. The formula for the kerosene and soap emulsion, as found most satisfactory by Mr. Hubbard, is as follows:

"Kerosene	2 gallons	= 67%.
Common soap or whale-oil soap	½ pound	= 33%.
Water	1 gallon	

"Heat the solution of soap and add it boiling hot to the kerosene. Churn the mixture by means of a force-pump and spray-nozzle for five or ten minutes. The emulsion, if perfect, forms a cream, which thickens on cooling, and should adhere without oiliness to the surface of glass. Dilute, before using, one part of the emulsion with nine parts of cold water. The above formula gives three gallons of emulsion, and makes, when diluted, thirty gallons of wash.

"The kerosene and soap mixture, especially when the latter is warmed, forms upon very moderate agitation, an apparent union; but the mixture is not stable, and separates on standing or when cooled or diluted by the addition of water. A proper emulsion of kerosene is obtained only upon violent agitation. It is formed, not gradually, but suddenly; in short, to use a familiar phrase, 'it comes' like butter. The time required in churning depends somewhat upon the violence of the agitation, but still more upon the temperature, which, however, need not be much above blood heat.

"When obtained, an emulsion of kerosene and soap is known by the perfect union of the ingredients, and the absence of oiliness, so that the liquid clings to the surface of glass or metal. It resembles a rich cream, more or less thickened according to the proportion of soap used in the mixture.

"These details have been fully set forth in previous reports, but it seems necessary to again refer to them, because, while the value of the kerosene emulsions as insecticides has been widely acknowledged, the important point of thorough emulsification has not been sufficiently recognized, and the agricultural press of the country in the discussion of this new application of an old remedy have very generally omitted to mention the methods by which a perfect emulsion may be secured.

"Thus in a horticultural journal of wide distribution we find the following: 'Mr. E. L. Sturtevant, director of the experimental farm at Geneva, N. Y., says that an *emulsion*, composed of one ounce of common soap, one pint of kerosene oil, and one and one-half gallons of water, *kept continually stirred while using to prevent the oil floating on the surface*, and used through the rose of a water-pot, will destroy all worms (on cabbage) that get thoroughly wet with the mixture,' etc. The italics, which are our own, sufficiently indicate the unstable nature of the mixture, to which this writer wrongly gives the name emulsion.

"An officer of another State institution, having become a discoverer of the

means of diluting kerosene by emulsification with milk, shortly after our publication of this method, repeatedly recommended a mixture of kerosene made by stirring simply, admitting, however, that 'if to be used very extensively, the permanent emulsion might be more convenient.'

"In Florida, where the original directions for making a good emulsion have been widely distributed, and where the remedy itself is rapidly coming into universal use among truck farmers, as well as orange and fruit growers, there is still need of greater care than is generally given to the preparation of the wash.

"Failure in forming a stable emulsion is due, in most cases, to insufficient agitation of the mixture. The emulsion can be very quickly and easily made by using a good force-pump, so constructed that it can be inserted directly into the liquid, which must be kept in constant and violent agitation by forcing it through some form of spray-nozzle back into the same receptacle. A pump otherwise good is less adapted to forming an emulsion if, instead of being inserted directly into the pail, it has a large and long supply tube, in passing through which the liquids are comparatively quiescent, and consequently have a tendency to separate.

"Another frequent cause of failure is the attempt to form an emulsion by churning together a small quantity of kerosene and a large quantity of diluent. Only a very unstable union can be effected by this means. The very essence of the process requires that the oil shall be broken down by driving into union with a smaller, or at most an equal, quantity of the emulsifying solution, after which, if a genuine emulsion is formed, it may be diluted *ad libitum* with water."

These emulsions are most useful agents in the destruction of scale insects, and have been especially valuable in the orange groves of Florida. Care must be taken to use petroleum only when properly emulsified; kerosene two gallons, common soap one-half pound, water one gallon. A thorough emulsification is necessary. When thorough there is an absence of oiliness and it resembles thick cream. Failure in forming emulsion is usually on account of insufficient agitation, also in using too small a quantity of oil with a large quantity of diluent. There should be less of the diluent than of oil.

After having obtained any good insecticide, its use is successful according to the satisfactory character of the appliances. He called special attention to the nozzles and other appliances planned and perfected at the Department of Agriculture, exhibiting samples and explaining their principles and mode of use. This nozzle is easily cleaned and with difficulty fouled. He considers it of great importance to success in applying insecticides, killing the insects without injury to the plants.

APPLES.—Round-headed apple tree borer (*Saperda Candida*). Facts brought to light by himself and Mr. Robson in 1878 are not generally understood. Most writers propagate the error of statement—the egg laid on the bark. The egg is inserted in incisions made by female. In healthy

trees the chances are that the larva will be drowned. Prof. Riley then referred to the fact that all along the Atlantic coast, for the last year or two, there had been noticed a considerable disfigurement of fruit, especially of apples. This had been traced principally to the snout wevil, the apple curculio, or *anthonornus quadrigibbus*. This insect perforated the skin of the apples and produced a large lump around where the perforation had taken place, this constituting the disfigurement alluded to.

The plum curculio also did much damage to fruit in the same way, but did not touch apples so long as plums were around. He next called attention to a trouble that had recently broken out among pears in the neighborhood of Meriden, Conn., the unwelcome intruder being a member of the great two-winged fly family. He called attention to this matter so that the Association, if they thought fit, might exert themselves to prevent the trouble spreading beyond its present somewhat restricted area. The speaker then went on to remark on

ORANGE RUST.

He observed that he had previously stated that kerosene emulsion properly applied was an excellent insecticide, and therefore in speaking of oranges he would confine himself to the chief trouble, which was outside of insects, and known as "the rust." There were certain people who always insisted that orange rust was the outcome of a disagreeable soil, and recommended the use of a certain chemical known popularly as "German salt." But the rust was not occasioned by the soil; its cause was well-known. It was due to a "mite." The working of this mite had been carefully studied by himself, and by his associates and agents in Florida and elsewhere, until they now knew all about it. They knew how the mite developed, how it produced the rust, and how that the rust never occurred save where the mite had been. The mite did not love strong sunshine nor strong shade, but loved the happy medium. The rust, as was well-known, did not hurt the quality of the orange, but spoiled its appearance and depreciated its market value. The mite that did the injury belonged to the family of four-legged *phytoptus oleovori*. The actual cause of the rust was the oxydation of the ruptured cells, and a perfect remedy lay in a milk emulsion with a little sulphur added. The adult mites were very delicate and succumbed immediately to this remedy, but the eggs were very tough and considerable attention had to be paid in applying the spray. A most useful appliance for spraying orange trees was the nozzle he had before alluded to attached to a bamboo rod, the center of which had been burnt out and an India rubber tube substituted.

Prof. Riley then gave some interesting facts regarding the action of the phylloxera on the vines of France some years ago, and told how the vast fields rendered desert by that pest were now being recultivated with the American grape vines; the two most popular kinds being the Clinton and the Taylor. The speaker denounced the *Treaty of Berne* as being most iniquitous, and said there was no danger of the importation of phylloxera into this country, which it was pretended this treaty prevented.

He then read the following correspondence as more fully setting forth his views on this treaty, and also on the effects of phylloxera in graperies in this country, with a view of showing how easily wrong conclusions may be arrived at:

"IN REFERENCE TO THE TREATY OF BERNE, AND THE PROHIBITION OF THE INTRODUCTION OF BULBS AND CUTTINGS FROM THE UNITED STATES INTO GERMANY.

"BUREAU OF ENTOMOLOGY,
"WASHINGTON, February, 9, 1884.

"SIR: I beg to submit the following report on the communication of Hon. A. A. Sargent, Minister to Berlin, to the Honorable the Secretary of State, which you have referred to me:

"Certain American exporters of grapevines (Messrs. Boelker & Sons, of New York), have complained to the Department of State concerning the exclusion of American plants from Germany, and Mr. Sargent reports upon the state of the German laws in reference to such importations.

"It seems that Germany, by the imperial decree of July 4, 1883, prohibits absolutely the importation of grapevines, cuttings and roots. The importation of grapes and husks and of all other plants is allowed only to nations which took part in the Berne Congress of 1881, and then only under certain restrictions as to packing, certificates from official experts, etc. Thus Germany has gone a step beyond the provisions of the Berne Congress, and the stringency of the decree has caused great excitement and indignation among nurserymen in this country.

"While no one can appreciate the necessity for stringent measures against the introduction of the phylloxera into non-infested countries more than I do, yet certain of the provisions of this last decree appear to me utterly useless, and, without doubt, they cause much loss and annoyance to nurserymen in this and other countries as well as to those of Germany, without producing any corresponding benefit.

"The clause in the decree prohibiting the importation of all 'nurslings, shrubs, and other garden products not belonging to the category of the grapevine, coming from nurseries and hot houses in the Empire,' is based upon the possibility of the winged females settling upon such plants and depositing the few eggs which give birth to the true males and females which produce the winter egg. I will repeat here, therefore, the conclusion which I have repeatedly urged in discussing restrictive legislation in reference to the phylloxera, and which the habits and life-history of the insect justify.

"The eggs from the winged females are most often laid in or on the ground near the base of the vine, and they are so delicate as to require especially favorable conditions of temperature and moisture to enable them to hatch. They must, in my judgment, infallibly perish when deposited on anything else than the lower surface of the living grape leaf where they can receive moisture by endosmosis, or in crevices in earth that is kept moderately moist by rain or dew. But even supposing that these eggs could hatch,

and the resulting female should lay her impregnated egg on any other living plant than grape, and that this egg should give birth in due time to the stem mother, she would inevitably perish without issue for want of suitable food. With the utmost care to supply the natural conditions, I have failed nine times out of ten to obtain even the sexual individuals, and it is much more difficult to get the impregnated egg. European observers have had the same experience. From this it follows that the introduction of phylloxera upon any other plant than the grape vine, at any season of the year, is impossible, and hence the folly of the prohibition.

"As to the possibility of its introduction upon grape vines themselves, however, there can be no doubt. The insect can be carried on the roots of vines in the winter either in the dormant larva state or in the 'winter egg' state, and in this latter state it may occur upon almost any part of the plant above ground, more particularly under the loose bark of the two-year-old canes, although recent observations have proven that whenever it occurs above ground it is produced rather from the gall-inhabiting type than from the more dangerous root form. Therefore the clause which prohibits the introduction of cuttings with or without roots into districts where the phylloxera absolutely does not exist, is fully justified by the facts. It may be well to state, however, that in districts where the phylloxera exists no better preventive can be adopted than the introduction of the hardy and resisting American vines as stocks upon which to graft the more susceptible European varieties.

"It should also be urged in this connection that, while the decree is justified in so far as it prohibits the actual introduction of vines and cuttings, there can be no danger from the mere passage through a non-infested country of such vines. These are necessarily boxed, and can only be properly and safely shipped during the cold or non-growing season when the egg is dormant; so that there is a practical impossibility in the introduction of the insect by such a passage.

"While I am rather in the dark as to the nature of the original complaint (as no copy accompanied the papers received from the State Department), the United States can safely and with great justice urge upon Germany the reversal of that portion of the decree which does not apply to grape vines proper.

Respectfully,

"C. V. RILEY,
"*Entomologist.*

"Hon. GEORGE B. LORING,
"*Commissioner of Agriculture.*"

"THE GRAPE PHYLLOXERA IN GRAPERIES—LEGAL QUESTIONS ARISING.

"BUREAU OF ENTOMOLOGY,
"WASHINGTON, November 5, 1884.

"DEAR SIR: In making to you a final report of my conclusions in reference to the diseased condition of certain European grapevines furnished by you last spring to Mr. Charles J. Osborn, of Mamaroneck, Westchester

county, New York, and as to whether the grape phylloxera (*Phylloxera vastatrix*) had anything to do with such diseased condition, it becomes necessary that I summarize the points made in your various inquiries sent to this Department since the first of July last, and particularly those made since my return from Europe. The following facts become manifest from a review of this correspondence:

"1st. The plants were obtained by you from the well-known firms of Ellwanger & Barry, of Rochester, and Hopes Bro. & Thomas, of Cherry Hill Nurseries, Westchester, Pa., and shipped direct to where they were planted. They were grown in pots in the usual way, and they were planted in the borders of a new grapery the latter part of last February. They were strong two-year-old plants, to all appearance in splendid condition, made up of leading exotic varieties, Black Hamburgs, etc. The borders, from all reports, were carefully prepared last autumn and winter, the materials used being old rotted sod made into compost, with the usual proportion of bone dust.

"2d. About the middle of June, after the vines had made several feet of healthy growth, the lower leaf-stalks began to weaken, allowing the two or three basal leaves from the main shoot to droop. From the time that the vines showed a failing the cause seems to have been earnestly sought for, and the question as to whether it was due to phylloxera injury raised. Finally, during July and August all parts of the vine began to turn yellow, the phylloxera was noticed upon the roots, and Mr. Osborn, his gardener, and yourself concluded that the insect was the cause of the unhealthy condition of the vines.

"Assuming such to be the case, you wish to know whether it was possible that the insect got into the grapery with the material used for the border, or whether it could have entered in some other way?

"On the supposition that the insect had been introduced on the vines you sold, you were held responsible by Mr. Osborn for their failure. This was the condition of the case when, on the 20th of September, you visited the Department and conferred with me in reference to the matter. I told you then that, from all the facts, I felt assured that you had arrived at a wrong conclusion in attributing the diseased condition of the vines to phylloxera, but that I would postpone making you an official report until I had made a personal examination of the case. My conclusions are now quite definite, so that I feel warranted in reporting with assurance, from the examination made of the vine sent early in July, as well as of those received later, both from the Cherry Hill Nurseries and from Mr. Osborn's grapery, that the vines were healthy and exceptionally free from phylloxera when they came from the nursery, and that even up to the time of their being uprooted and destroyed the phylloxera work had at no time been sufficient to do them material harm. A root received October 2, and that had already been thrown away, showed no rotting, and so few traces of phylloxera that I considered very generally over the country east of the Rocky Mountains; that no vineyard, unless in an exceptional situation, is free from it. Ordinarily, how-

ever, on the majority of our indigenous American vines, its presence results in little or no harm. Even in graperies it may almost invariably be found, but rarely in sufficient numbers to seriously injure the plants. Moreover, in its very worst manifestations, and upon those foreign vines most susceptible to its attacks, the vine does not succumb until the third year after the introduction of the insect. The disease in its acute form is well marked by a peculiar yellowing of the leaves, diminished growth, and absence of tendrils, while the root-system is generally entirely rotten. The presence of the insect in more or less abundance on the fibrous roots is no evidence of injury, but rather an evidence to the contrary, for so long as there are fibrous roots in abundance for it to attack, the injurious stage of the disease, namely, the rotting or decay of the larger roots, can not be initiated.

"From all these facts, and others that might be mentioned, I do not hesitate to say that Mr. Osborn's vines were not injured by the phylloxera, and feel that the digging of them up and casting them aside was the result of false and unjustified fears and imperfect knowledge of the insect. As to whether the insect was introduced from the nursery, or got into the grapery from surrounding vineyards, or was introduced in the sod, the probability as between the first and second suppositions is that it was introduced with the plants; for while the evidence shows that the plants were remarkably healthy, yet, as I have already stated, the insect is everywhere found in those parts of the country from which the vines came. A few of the insects may very probably have been on some of the vines, as they are almost sure to be on such as are two years old. That they were in the new-made soil is extremely improbable, as the insect is confined to the grape-vine, and could only have been thus introduced from soil taken from a vineyard.

"This is as far as I feel justified in rendering a report from the standpoint of the entomologist. What the real cause of the trouble was I must leave to others, but upon consultation with Mr. William Saunders, the horticulturist of the Department, I find that it is no uncommon thing for vines planted as these were, in very rich, deep borders, to wilt and show evidence of disease in the manner in which the vines in question did, especially where they are kept too moist; so that the probability is that they languished from the character of the soil and of the treatment. This view is supported by a sample of the soil that I brought to Washington for examination, and also by the fact that I saw other potted vines in Mr. Osborn's grapery that had shown similar symptoms, but had not been thrown away, and were still living and promising well.

"Finally, in the event of the phylloxera becoming numerous enough to cause any injury, it would certainly be unwise to dig the vines up prematurely where the judicious use of kerosene emulsion or bisulphide of carbon would readily destroy the insects, and could be so easily employed under such circumstances as those surrounding Mr. Osborn's vines.

"I have the honor to remain, yours respectfully, C. V. RILEY.

"MR. FRED. W. KELSEY, 208 Broadway, New York City."

President Earle—Prof. Riley has given us a very valuable and instructing address, for which we, as a Society, are grateful. There are many points in Dr. Riley's address which might, with great propriety, be discussed at length, but I see our time will not admit of such discussion. We have another gentleman of distinction from whom we will now hear. Ladies and gentlemen, I have great pleasure in introducing to you Dr. Morris, of Jamaica, Superintendent of the Botanic Gardens, who will now address you on the horticulture of that island.

[The Secretary regrets that he can only give a brief synoposis of this interesting address.]

Dr. Morris gave a brief description of the West India Islands, of which Jamaica is one of chief importance. The total area of Jamaica is near one hundred thousand square miles; population, 1,750,000. The annual exports amount to $500,000; imports, $40,000; the revenue about $10,000. Our shipments of fruit are almost entirely to the United States, consequently the imports of lumber and food supplies are mainly from the United States. The States are therefore our debtors. Bananas are cultivated only for food. Good forest land is cut off for a few years' crop of banana; the land is thus ruined—the second growth forest is of no use. We utilize the bananas as shade for more valuable sorts planted under them, as coffee, cocoa, chocolate, etc. It costs $25 per acre to plant and cultivate the banana for the first year; at the end of eighteen months we will probably get $75 per acre in return.

Oranges are mostly produced on self-sown trees. Oranges thus sown are free from disease, large and sweet, and as good as the best in other countries.

Cocoanuts are largely grown, and with little trouble. We pick out the largest and heaviest nuts for seed. They are planted in the nursery, where they are sprouted and then transplanted. In six years they bear from forty to one hundred nuts per annum. It costs us $40 per acre to establish a cocoa grove to the eighth year of culture, when the trees will bear, say fifty nuts on each of fifty trees per acre, the nuts being worth from $40 to $70 per thousand when green and unhusked. For the American market we have to husk them, when we get more for them.

Pineapples are grown to a considerable extent in Jamaica. Many varieties are grown, some, as the Black Antigua, being indigenous. The sapidilla (*Sapotaceæ*) and the cherimoyer (*Anonaceæ*) are each grown to a considerable extent.

We have many varieties of the Passion flower. Some grow as creepers over arbors and produce very fine, refreshing fruit.

The Avocado or Alligator Pear, sometimes known as the Servant's Butter, is eaten with cold meats or used in a salad. It has a creamy consistency and nutty flavor, and is greatly admired in the West Indies. It grows on

small trees like the local Ligustrum. The Tree-tomato, (*Solanacea,*) is an acid fruit much used in various ways, especially for pickling, etc.

Mangos are widely cultivated in the tropics. It is a very delicate fruit, next, in that respect, to the cherimoyer. It ripens from June to August, often extending to October. It is very seldom shipped to the United States, because of the abundance of fruit in that season. The tree is handsome, growing from thirty to forty feet in height. In its season the peasantry almost live on the mango. It is necessary to know how to treat and how to eat some of our fruits to appreciate them.

Mr. Munson, of Texas, proposed a vote of thanks to Prof. Riley and Dr. Morris for their very interesting lectures, which was unanimously adopted.

President Earle—The Committee on Louisville Exposition will consist of Dr. Hape, of Georgia; Mr. Smith, of Wisconsin; Mr. Parry, of New Jersey; Mr. Campbell, of Ohio, and Mr. Jessup, of California.

Fourth Day—Saturday.

FORENOON SESSION, January 17.

President Earle, after calling the meeting to order, extended an invitation to the Society, in case it was decided to hold meetings after to-day, to meet in his parlors in the city, as the rooms at present occupied, aside from being in a noisy location, were too cool for comfort or health. This invitation was accepted, and on motion a meeting was arranged for 7 P. M. in the parlors of Pres. Earle.

L. B. Pierce, of Ohio, was then introduced and read his paper on

SOME HINTS ON THE LANDSCAPE IMPROVEMENT OF COUNTRY HOMES.

BY L. B. PIERCE, OF OHIO.

In the rise of the human race from degradation and barbarism to the highest civilization three prominent phases characterize its development.

The main characteristic of the first of these phases is utility; of the second, comfort; of the third, ornamentation.

The lowest savage estimates nearly everything by its value for immediate

use. Grubs, bugs, worms, roots and nuts form his food, for he finds them everywhere at hand ready for immediate use.

As the human being rises in the scale, he begins to look to his personal comfort, and the utility of an article is looked at from a number of standpoints not known to the barbarous races. After awhile he develops æsthetic faculties, and articles of utility are made with reference to how they look, as well as adaptation to use and comfort. Different shades of these three characteristics of the development of civilization are to be found everywhere, and circumstances often make the lowest grade quite prominent, even in the midst of a highly advanced civilization. For example, the pioneer going into a new country to hew himself a home is necessitated to buy a heavy wagon to transport building materials and the products of his agriculture. This wagon is neither comfortable nor artistic, yet he must use it until better circumstances and improved roads enable him to buy a spring wagon, and finally a costly *coupe* or phaeton. Again, he needs a garden, a barn, a yard for his stock, and various conveniences around his place, and utility is apt to take precedence of everything else. He wants fruit and he at once plants trees; at the same time he needs shade, and he naturally thinks the shade of an apple or cherry tree just as grateful as that of a maple or oak, which bear no edible fruit. These trees are often planted where future years show they should not be, and after the man has acquired a competence he finds himself surrounded with a jumbled up mess of necessary conveniences that are really very inconvenient and inharmonious. The progress of civilization in this country is gradually leading many to more advanced thought upon the planning of their homes, and there is actually a demand for hints and advice upon the subject. This leads me to offer a few suggestions upon the topic, which I do with some hesitation, as a body of educated and progressive horticulturists like the ladies and gentlemen of the Mississippi Valley Society need such suggestions far less than tens of thousands who will never see its reports.

As I have before hinted, a great many of what we may designate as the grown-up homes of the country are in a condition far from satisfactory when judged by a high standard of either taste or convenience.

The problems concerning the rearrangement and beautifying of such home surroundings are intricate and varying, and there are but two ways of dealing with them: one by special plans for each; the other by the study and application of general principles, which lead to educated taste and from which important details can be inferred or derived.

Within the Mississippi valley a larger share of the homes in process of being established, or yet to be established, are located. It is especially fitting, therefore, that this Society should grapple with the problems that pertain to the making of our homes more convenient, beautiful and happy. In discussing these problems I shall not attempt to say aught in regard to that portion of the valley known as the Sunny South. With its wants, the requirements of its people, and its ornamental plants, I know so little that I

should only expose my ignorance by any attempt in this direction. I shall, therefore, confine myself to the northern and central portion of the country covered by the membership of this Society.

In this portion the winter with its howling blasts is the prominent agent of discomfort, of expense and, I may add, of death. To ward off its chilling, life-destroying frost millions of grates glow with the carbon of the coal mines, and tens of millions of stomachs grow warm as they consume the golden carbon of the maize.

The farmer of Massachusetts, who raises his small-eared corn by the hardest work, with hand hoeing and hill fertilizing, shudders when he hears that the Kansas farmer is using his corn to feed his kitchen stove. Yet all over the West thousands of bushels of corn are being consumed for the production of heat with much less reason or excuse than that that leads to the burning of corn in the fireplace. When the Kansas farmer has corn so cheap that it will not buy its heating equivalent in coal, then he is justified in burning it. Such a condition is unfortunate, but it can not be said to be wasteful. When, however, he, by neglect, permits his family and stock to suffer from outward cold and obliges them to consume larger quantities of food, so that the internal fires of the body can in a measure make up for the outward exposure, then he is wasteful and unjustifiable in the direct ratio to the ease with which he can surround himself with protection from cold.

I have often wished, as I have passed cheerless, wind tortured homes, that some exact estimate could be made in dollars and cents of the value of the heat driven off and dissipated each winter.

The blowing of a northern wind for a few hours and the lowering of the thermometer a few degrees causes thousands of fires to be lighted in this city of New Orleans, and the actual expense to the citizens of this city of a cold northern wind, lasting but a short time, would amount in the aggregate to a very large sum of money, and when the temperature is lowered sufficiently to cause frost, the cost of a norther is very largely increased. The cost of lighting the fires, the fuel consumed, and the cost of the extra clothing, represent what would be saved were a barrier erected that would keep off these cold northern winds.

Of course this would be impossible, but it illustrates the thought I wished to get at, the value that attaches to the shutting out of cold winds. Last winter, in passing from my home to Kansas City, I did not see a single home that had any artificial or complete protection from prevailing winds. Beyond Kansas City, in Kansas and Nebraska, wind breaks are quite common, but they are all of deciduous trees. Now the difference in value between deciduous and evergreen trees as a winter protection is about the same as that between gauze and flannel, and I often find myself wondering why so few avail themselves of nature's beautiful winter garments. It is really, however, the old story of utility first. Quick growing deciduous trees make firewood.

The first point I would make, then, would be to plant evergreen trees, not

in straight lines nor singly, but in groups of varying size in the direction of prevailing winds. When purchased young they cost but little, and a few dollars invested in the beginning will grow in time into objects of wonderful beauty and furnish an almost impervious protection from the wind. If you ask me what to plant, I would answer: plant such trees as are known to succeed in your State. In Northern Ohio the two most valuable and rapid growing shelter trees are the Norway spruce and Scotch pine. In places where a continuous line of trees in the form of a hedge must be used I know of nothing better than the American arbor vitæ, especially in places where there is but little room, as its height is great in proportion to its width of base. I have been much interested in reading Prof. Budd's articles in the *Prairie Farmer* in reference to the hardiness of conifers and deciduous ornamental trees in Iowa. He mentions the American white spruce and Siberian silver fir as both enabled to withstand that climate. The white spruce is a noble tree—a slower grower than the Norway, but scarcely inferior in beauty. There are some beautiful specimens of the Siberian fir in Spring Grove Cemetery in Cincinnati, and I have seen a few specimens elsewhere. It is one of the most beautiful of evergreens, and groups finely with the American hemlock, which, by the way, is the most beautiful of all American conifers. The red pine of Northern Michigan is, for the first twenty years at least, the most beautiful of any pine with which I am familiar, and deserves a trial in the Middle-Western States.

Although foreign to the point in discussion, I wish to call attention to the Lombardy poplar as a deciduous wind-break. It attains a great height very quickly, and a double row eight feet apart makes as perfect a protection as is possible to attain with any other deciduous tree occupying double the amount of ground.

Having secured protection to our home, the next point is to see that a reasonable piece of grass surrounds at least two sides of the house. Next to air, water, and sunlight, the cheapest and most abundant product of the north temperate zone is grass. When closely shorn and kept green with timely watering it is the most pleasing of all landscape objects, and without grass in perfection all attempts at landscape adornment lose greatly in value. Having secured as much of grass around our home as we can keep in first-class condition, and no more, and defined it by suitable and necessary paths, we can turn our attention to ornamenting it with trees and flowers.

We now enter upon a vast and to many a mysterious subject. It is not, however, so mysterious as many imagine. There is not a country in the world that possesses so many really beautiful indigenous plants and trees as America. The great trouble is that many wish to get a greater portion of them in one dooryard. After a few years these much-planted dooryards become a tangled forest, lacking beauty and convenience, and the owners vote ornamental planting to be either an unguessable riddle or a humbug.

We all admire the beautiful live oaks of the Exposition grounds, but how much of beauty would these trees possess if huddled together in the style of

northern villages? It is their magnificent development in untrammeled space that gives them their perfection of beauty and grandeur, and we will not have come to New Orleans in vain if we learn the lesson that they teach. We should ever bear in mind that it does not matter so much what we plant, provided the tree or shrub has some intrinsic beauty, as where we plant it. In some portions of the country the golden willow is a very common tree. As it ordinarily grows, crowded in with other trees, it is not particularly observable. Plant a slip in some moist, rich dooryard, and keep it clipped back, and it can be grown for years as a large shrub, and its wonderful golden beauty in the latter part of winter will attract attention from every one. In Northern Ohio the swamps are filled with white dogwood or *Cornus sanguinea* of the catalogues. Crowded and neglected, its bark covered with cinnamon excrescences, it does not appear at all attractive; but remove a slip of it to the lawn, give it care and room, and it speedily grows into the most beautiful winter ornament I know of, its branches being a crimson scarlet from November to May. It is scarcely possible for the florist or gardener to produce a more charming effect than nature produces by setting a single plant of the common yellow cowslip nestled down between the light green bogs of the marshy meadow.

Of course we can not transplant the flora of the marshes to drained and finished lawns and produce exactly the same effects, but a careful study of nature's combinations is the only way to become perfect in the knowledge of landscape decoration. Books may teach principles and give special designs, but observation, and, above all, the use of common sense must be the main reliance. Every principle of art is founded upon a good, sound reason, and landscape gardening is not an exception. If you plant an object of summer beauty, you can place it at the end of some long walk, or in some retired nook, and somebody will take the trouble to go and see it; but if you plant a winter ornament it must be where you can see it from your sitting-room window, or from some sheltered balcony, or the chances are great that it will dissipate its beauty unseen by any but the birds and rabbits.

Reason will or should teach you that the larger will hide the less, that the little tree will in time make a large one, and that loudness and profusion are as great faults in the decoration of your home surroundings as in dress or painting.

This topic might be enlarged upon at length, but with the caution of the Secretary in reference to lengthy papers before me I can be excused from saying more than to urge each one by precept and example to push forward the work of beautifying the homes of our country. They should be the most beautiful in the world, as they are undoubtedly the happiest and purest.

DISCUSSION ON MR. PIERCE'S PAPER.

Secretary Ragan—I commend this paper to many who neglect to adorn their homes with beautiful trees and plants.

Mr. Wilcox, of California—The evergreens on my grounds are worth hundreds of dollars in pleasure and comfort every year. As a rule in California the homes of horticulturists are more or less adorned with trees and flowers. This is not so with the stock ranches.

Dr. Hape, of Georgia—In the ornamentation of our grounds we are too apt to run after novelties and neglect the many beautiful trees and plants in our native groves.

Mr. Stoner, of Louisiana—We pay too little attention to the ornamentation of our homes. In Western Louisiana we are subject to occasional droughts. It is important to select trees that will withstand our climate. As a rule trees from Japan succeed with us. The spreading cypress and the *Cupressus erecta* make the most rapid growth of any evergreens with us.

President Earle, of Illinois—I would rather lose my apple trees than my evergreens. I could buy apples, but I could not buy the charm of evergreens about my home.

Mr. Wilcox—The Lombardy and Carolina poplars sucker badly, and we take them up. The gum tree (*Eucalyptus*) exhausts the soil. Some of the evergreens, as the English laurel, die from the effects of too much water.

Mr. Pierce, of Ohio—I advise the Lombardy poplar only as a wind break. I know it does well as far north as the 39° of latitude.

Mr. Cassell, of Mississippi—The holly is one of our most lovely trees. It grows more rapidly if the soil is properly fertilized.

Mr. Jessup, of California—I am much obliged to Mr. Pierce for his paper. Mere architecture will not adorn a place. Tree planting alone will give beauty to an humble home. In California we like the eucalyptus better than the Lombardy for wind breaks.

Mr. Munson, of Texas—This subject opens a wide field of discussion. We need exact knowledge of habits, etc., of trees and shrubs to enable us to plant intelligently. Some places are elaborately planted, and yet they are not inviting. Others always have an inviting appearence. The taste and skill of the planter have all to do with the result. In Texas we have a number of native trees

and shrubs that are fine. Some of them will thrive as far north as Kansas and Missouri.

Mr. Wright, of Iowa—A botanist who knows the habits of plants and trees can plant to successful effect; but the farmer seldom knows the way to plant artistically. In the East the Lombardy poplar does well, but in Iowa it is worthless. There are some northern poplars that will take its place, but they are rare. In planting we must consider habits of trees as well as soil and climate. Our Society should be able to give valuable information to ornamental planters.

Mr. Francis, of Missouri—Is the holly difficult to transplant?

Dr. Hape—By removing the foliage they may be transplanted with fair success.

Mr. A. C. Kendel, of Ohio, was introduced, and read the following paper:

OUR NATIVE GRAPES—THEIR CULTURE AND VALUE IN NORTHERN OHIO.

BY A. C. KENDEL, OF OHIO.

It is not the intention to give anything new in the culture of grapes; an occupation so old, so fully tested in all the ages, can hardly have anything novel that has not been tried.

The cultivation of the grape on an extensive scale was undoubtedly one of the occupations of the antediluvians, for it is on record that after the flood Noah turned husbandman and planted a vineyard; not a few experimental vines, but a vineyard. He must have based his confidence upon the earlier experience of himself or former neighbors. He went bravely to work, planted his vineyard, and in due time ate of the fruit thereof.

One of the chief evidences of the fruitfulness of Canaan was the immense cluster of grapes found at Eshcol, which required two men to carry back to camp.

The Israelites undoubtedly appreciated the value of Palestine the more on account of the vineyards which had been discovered, and yet they were not content with what they found, but planted more. The hillsides then, as now seemed to be the most favored spot; pruning and dressing then, as now seems to have been an interesting subject both for practice and discussion. May we not imagine discussions before Solomon of the best way to dress and prune his vineyards at Baal-hamon. Solomon, the king, was quite content to take a thousand pieces of silver from each of his tenants for the crop, and would undoubtedly take a lively interest in these discussions.

Later on, when Europe became civilized, the peaceful cultivation of the grape kept pace with the other arts of husbandry, it having been introduced by the Romans into Gaul at about the beginning of the Christian era. Before this vines were found growing wild in Sicily and other islands of the Mediterranean, as well as on the coasts of Southern Europe.

This industry was brought to a high state of perfection wherever situation, soil, and climate were congenial for them, for there, as here in our land, every spot is not adapted to their perfection. The favored localities in France, Germany, Hungary, and other parts of Europe, are too well known to require mention here.

Now to our own land. When the vinedressers of Europe, particularly of France and Germany, sought these shores for their future home, they naturally brought with them their love for the cultivation of the grape, and, as is their custom, adapted themselves to the material in hand. Everywhere the bountiful hand of nature had planted native vines quite at home in every latitude, climbing high up among the upper branches of the trees supporting them, where the benignant sunlight bathed their spreading foliage and ripened their diminutive clusters as far as possible, to be finished by the rude hand of early frosts. Looking among these, the frost varieties, there seemed to be but little encouragement.

The native fox varieties promised better results, being larger fruited and quite hardy. Improvements followed. There came up the Clinton, evidently descended from the frost varieties, also the Isabella, Catawba, and Cape or Alexander from the fox varieties.

With the Isabella there seemed encouragement enough for vineyard culture, and many were the vines thus planted. It is remembered when almost every person in our city of Cleveland had one or more Isabella vines, under the shadow of which they could sit and enjoy the abundant crop. When there were but three or four feet of space between the houses a grapevine would be sure to climb up to the roof, where convenient trelises would accommodate the spreading canes and the pure, unclouded sunlight pour down upon the healthy foliage. In these days crops of several hundred pounds from one vine were not unusual when that vine had abundance of room. The prevailing price of 12 to 15 cents per pound would pay the growers very handsomely; thus, in a few years these vines often produced more cash than the humble thirty-foot lot cost the owners.

Alas! this state of things has passed. With the advent of coal for fuel, the unwholesome, smoky atmosphere, the gas, and intermingled fumes of sulphuric acid, have caused these vines to perish one by one, to the great surprise of their friends.

About the years of 1840 to 1855 fine vineyards were cultivated with profit along the Ohio river, in which the eminent N. Longworth, of Cincinnati, took a personal interest, and to his honor be it said, he spared neither time, money, nor energy to aid this industry. He imported many varieties of vines from Europe, which, after careful tests, proved unsuitable and entirely worthless for our climate, and were abandoned.

The Catawba seemed to Mr. Longworth to be the only variety of native origin worthy of cultivation. In this opinion he has to this day many faithful followers in our neighborhood who fully agree with him.

Along the Ohio river most of the vineyards have been abandoned on account of many years of successive rot making the culture unprofitable.

With the introduction of the Delaware and Concord, a new impetus seemed to pervade the grape interest, and extensive vineyards were planted, at first only on sandy soil, as no one thought that clay could possibly ripen the fruit, but experiments upon the islands of Lake Erie, where the soil is of the stiffest clay and the sub-soil hard lime-rock, opened the eyes of growers to this new fact, and in a few years sand was entirely neglected for the more profitable clay.

Great enthusiasm now prevailed; land which would not produce a fair crop of weeds was esteemed to be worth $1,000 per acre for grape culture, and many investments were made by associated capital, as well as private enterprise. With the increased production, however, prices of fruit depreciated, and dividends became small, cooling the ardor of speculators.

The careful cultivator, however, was not dismayed by these slight discouragements, but diligently toiled on, pruning long, pruning short, testing his ground, testing new varieties, gaining experience, sometimes riding hobbies, often laying down theories afterwards to be abandoned, seldom meeting with total failure, but always on the alert to discover what caused his partial failures and promising himself to profit by past experience.

Such intelligent, discriminating care and industry have met with suitable reward along our lake shore, and to-day there is not a crop grown in our county as valuable as grapes for table use; and, indeed, with us there is not a fruit crop so certain. If not overcropped by ignorance of pruning or greediness, a certain quantity can be depended upon annually, providing of course an untimely frost or hailstorm do not destroy them. Thus far in the history of grape culture in our section there has not been a total failure. In 1883 the grape rot among the Concords took the cream off the profit from the section west of the Cuyahoga river, while the eastern part of the country gleaned an abundant crop which brought good prices.

The season of 1884 was a most favorable one, the harvest abundant and quality most excellent, extending throughout our grape belt, which, as far as now developed, is one to two miles wide close along the shore wherever the soil is clay or loam. Experiments with suitable soil, but further from the shore, have usually proved unsatisfactory. Thus we have about forty miles west of the city and fifteen to twenty miles east, which is almost one continuous vineyard, intervening spaces filling up rapidly.

Strange as it may seem there is a narrow belt of about one-half mile wide beginning at the spot where our nation has laid away all that was mortal of her honored Garfield, and extending some six to eight miles east, where the Catawba grows and ripens to its greatest perfection. Here are some vineyards which have been in constant bearing for twenty to thirty years. There are specimens on exhibition at this meeting which were picked from a vine-

yard planted twenty-eight years ago. The Society will have an opportunity to test their quality.

Forty years ago the Catawba ripened so late with us that only an occasional vine was planted, as a doubtful experiment. In time they have be come acclimated until they now ripen before Isabellas and almost as soon as Concords, thus duplicating the experience of Europe, where, as is well known in Gaul and Germany, at the beginning of the Christian era, the climate was found too cold to ripen the grape.

The question is often asked: Will not this constant increase of acreage overstock the market with table grapes and reduce them to an unprofitable cultivation? It is not probable that this will be the case in sections where grapes do well, for they would pay to grow at two cents per pound for Concords, three cents for Catawbas, and four cents for Delawares; of course the present prices, being at least 50 per cent. higher than this, pay much better; about three tons per acre of Concord, bringing $70 to $80 per ton, or two tons per acre of Catawba, bringing $100 to $120 per ton, or one and a half tons of Delaware, bringing $130 to $140 per ton, are considered only fair crops with us. In many instances these figures are exceeded, but they may be taken as an average of ten consecutive seasons.

Thus it will be seen that the net proceeds of any of these varieties is from $200 to $250 per acre. Deducting the average cost of pruning, cultivating, tying, etc., of $25 per acre, and the almost necessary $6 to $7 for 200 to 300 pounds annually of bone dust per acre, still leaves a handsome profit of $200 per acre as a reward to the cultivator.

Allow me, gentlemen, to suggest this matter of fertilizing the grape as a subject for discussion.

Another very important advantage in a grape crop is the length of time they may continue on the vine after ripening, when, instead of deteriorating like many other fruits, their quality is constantly improving. When markets are overstocked they will bide the time when wanted at better prices, thus relieving any unnecessary pressure.

Our country is large, its requirements great. As people become accustomed to the use of such wholesome fruit, it will become a necessity for them to have grapes when furnished at reasonable prices. With the rapid and unlimited means of transportation, every place can be supplied with this luscious fruit, and the production will not be likely to exceed the increased demand of an ever-increasing population.

Nor is it too much to hope that future ages, like the present and the distant past, may look upon the grape,

> "Sabled by the solar beam,
> Now the fiery clusters teem
> In osier baskets, borne along
> By all the festal vintage throng
> Of rosy youths and virgins fair,
> Ripe as the melting fruit they bear."—*Anacreon.*

Vice-President Munson in the chair—In order to connect the discussions, and so gather kindred subjects together, we will call on Mr. Williams, of New Jersey, for his paper.

PRUNING AND TRAINING THE VINE.

BY E. WILLIAMS, OF NEW JERSEY.

Mr. President and Fellow Horticulturists:

It may seem presumptuous that I should leave my Northern home and come to this Crescent City of the tropics to act the role of teacher to such a body of veteran and expert horticulturists as are here assembled.

Seeing that I am but an humble pupil in the primary department I feel that my proper place would be among the audience.

When your Secretary applied to me for a paper for this occasion I answered him in such a negative way that I confess I was surprised on receiving notice that he had assigned me to this position. I fear I shall disappoint you. However, holding as I do, that we are never too old to learn, and that sometimes an idea, or principle, however simple and commonplace it may be, is remembered and made to stick, by the peculiar manner or circumstances attending its presentation, I shall ask your indulgence a short time while I offer a few thoughts on the subject assigned me.

The first or cardinal principle attending my horticultural efforts of this kind, by both voice and pen, has been and is to educate and encourage the people to grow and consume more fruit, believing as I do, that a generous fruit diet by the people pays the largest profit on the investment; and, that those who own and till the soil of this fair land should have and enjoy that profit at first hands. I hold this should be the primary object and legitimate mission of this and kindred societies, and not be lost sight of by the commercial aspects of the case.

There should first be an abundant family supply, and the general public will readily take the surplus. To accomplish this the elementary principles should be made so plain that the merest tyro can easily understand them.

My province, therefore, in this brief paper, will be to tell you "what I know about" pruning and training the vine, as applicable to the garden and vineyard; and if, perchance, any of my hearers here, or my readers hereafter, shall get an idea of practical benefit to them my purpose will be accomplished.

From long and somewhat extended observations I incline to the opinion that there is no operation of the fruit garden so little understood as this one of pruning the vine. Notwithstanding all that has been written and published in regard to the matter, the masses are still lamentably ignorant on this subject. Whether this is due to the ambiguity of the instructions given, or to the carelessness and thoughtlessness of the readers, I am not able to say. I may say, however, judging from local observation, that not one in

twenty owners of a few vines understands the subject well enough to do his own pruning. I once heard the president of a prominent farmers' club say that he had read all the standard and current publications on this subject, and yet had not the knowledge or confidence in his ability to prune his own vines, always hiring it done.

I find also that the so-called professional gardeners, and those who make a business of pruning vines in their respective neighborhoods, often exhibit a remarkable lack of intelligence in their work, their aim apparently being to cover the trellis and get a shade as quickly as possible. These vines are then allowed to care for themselves until the next annual pruning. Pruning for shade is one thing; pruning for fruit another. As a rule, too much wood is left. It is common to err in this direction. Excessive growth of wood in tree or vine is not conducive to fruitfulness; yet the latter is dependent on vigor and health and their attendant conditions.

An expenditure of all energies in one direction for the attainment of a single object in life is to neglect others of equal importance.

The formation and development of fruit buds may be likened to the halting of a railroad train for wood and water; and the development and maturity of the crop of fruit to the delivery at the terminus of its load of passengers accumulated along its journey. If the load be excessive, beyond its ability to carry, relief by unloading or some other method must be had, or the train will come to a full stop between stations.

A proper balance of the vital forces, a due consideration of the ability and capacity of the vine, is of great importance.

The development of fruit is where the strain comes, and the impatience and haste to get fruit quickly and plenty of it (national traits of the American people) are the prime causes of many a failure. Vines are allowed to overbear, especially young ones. The demands of the fruit exceed the ability of the vine to supply them. The new wood near the base of the vines is robbed by the excessive demands of its more vigorous neighbor beyond, and failing to ripen, death is the inevitable consequence; and in a few years, if not renewed, the fruit-bearing wood is at the top of the trellis or at the extremity of the vines. The novice, before attempting to prune a vine, should bear in mind a few facts and principles:

First. That, as a general rule, the fruit-bearing canes of this year are grown from buds on last year's canes; in other words, the wood of this year contains the buds which produce the fruitful canes of next year.

Second. That the fruit buds differ from wood buds only because of better development.

Third. That a cluster is a fruitful tendril, and that the ordinary capacity of a fruitful bud is to develop, on an average, two or three of these fruitful tendrils, or as commonly expressed, clusters of fruit.

There are, however, exceptions to this rule: notably, five or six clusters on a cane of the Elvira being quite common.

Fourth. That the tendency of the sap is to the extremity of the vine; that

the straighter the cane the more rapid the growth, and the strongest growth from a pruned cane will generally be found nearest the end.

Fifth. That it is an easy matter to overtax a young vine by endeavoring to make it produce and ripen more fruit than it is capable of doing. A young vine can not yield the crop that an older, matured vine can without injury any more than a young boy or girl can do the work of an adult; and it is as unreasonable to expect it in the one case as in the other.

It is said that "order is heaven's first law," and the owner of every vine ought to possess enough of that divine quality to be able to adopt some system for training and pruning it.

A few years ago I happened to call on a gentleman who boasted of his profitable grape crop, which he had just sold at two or three cents a pound, on the vines. He had but a few vines, but an acre at that rate, he thought would be profitable. In reply to my inquiry as to his system of pruning and training he replied, he did not understand the science of it. They were on an arbor, and in the spring he took a grass-hook and clipped off the ends of the young canes where they were so long as to be in the way. "Come and see them!" I did so, and, of course, expressed myself gratified to learn he could grow satisfactory crops under such conditions, but mentally concluded I could not and should not adopt his method. The following season I met him and anxiously inquired about the condition of his grape crop. His reply was, "A failure. Did not ripen at all." I was not disappointed. I could not see how it could be otherwise. The fact is, such slip-shod methods do not result in giving prize clusters or premium crops, however satisfactory they may be to the grower in other respects. This will apply to other crops as well as grapes, and I think I may venture to say it is *one* rule to which I will take no exceptions. It is true, we sometimes hear of great crops taken from vines allowed to care for themselves, but I have never known any to do it year after year, and if any one has received an award of a gold medal or silver plate from this or any kindred society for exhibits of this kind it has escaped my notice.

The elementary principles relating to the vine already named ought to be so plainly understood that every person of ordinary intelligence, who is the fortunate possessor of a single vine, should be able to prune it with some degree of accuracy.

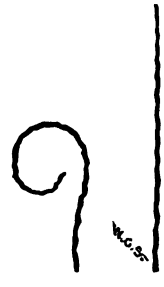

FIG. 1.

The eye is often a quicker and better conductor of ideas than the ear; and as I shall have occasion to appeal to both of these senses as I proceed, I will now ask your attention to some rough sketches I have prepared to assist in explaining the text. First I must appeal to your imagination and ask you to suppose that Fig. 1 represents two streams of water of equal length and fall. You will readily see that the water will run a given distance in the straight one quicker than in the other, because there is nothing to impede its velocity.

Now we will suppose them to represent two vines. The sap will flow up

the straight one faster than in the other, because the bending of the latter contracts the sap vessels and impedes its progress. If we cut the erect cane off at five feet high the upper buds will make the strongest growth; whereas, if it was bent down like the other the flow of sap would be checked, and the buds along the entire cane would make a more uniform growth.

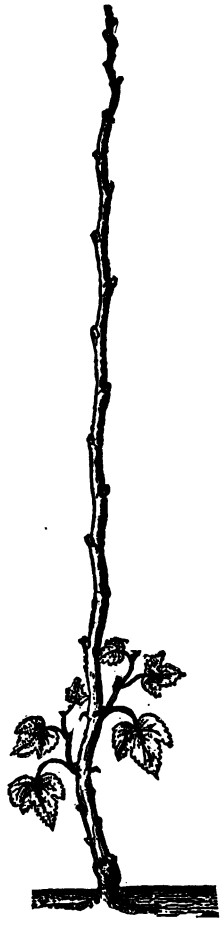

FIG. 2.

The habits and characteristics of vines are so variable and the systems of pruning and training so numerous and susceptible of so many modifications to suit the ideas or whims of the individual that it would be folly to designate any particular one as the best for all, as occasions and circumstances may exist when any one of them would be "more honored in the breach than in the observance."

I shall therefore content myself with noticing a few, including my own practice, and give the reasons for the faith that is in me.

The pruning of a vine should commence before it is planted. In vineyard practice I set a stout stake where every vine is to be planted, for the purpose of supporting not only the vine but the wires of the trellis also. To add to the durability of these stakes, the bottoms should be coated with coal tar, crude petroleum, or something of like character.

I plant a vine at each stake, shortening the roots to about ten or twelve inches, and the top to three or four buds. As these buds start I select the strongest one, rubbing off the rest, and keep this one tied to the stake as it grows, and pinch off all laterals as they appear to one leaf. By thus concentrating all energies of the young plant (Fig. 2) into one channel I get a single cane of far greater value than all would have been had they been allowed to grow. The next season this cane is cut down to three or four buds, and unless it made a growth of three feet or over only one cane is allowed to grow the second year; otherwise two are grown and treated as before. Sometimes a vine,

FIG. 3.

owing to favorable soil, or excessive inherent vigor, will grow sufficiently strong to be ready for the trellis at one year's growth, but ordinarily two years are required.

It now becomes necessary to decide on the form and style of trellis and the system of training and pruning to be adopted. A once popular, and still prevailing style to some extent, is shown in this sketch. (Fig. 4.)

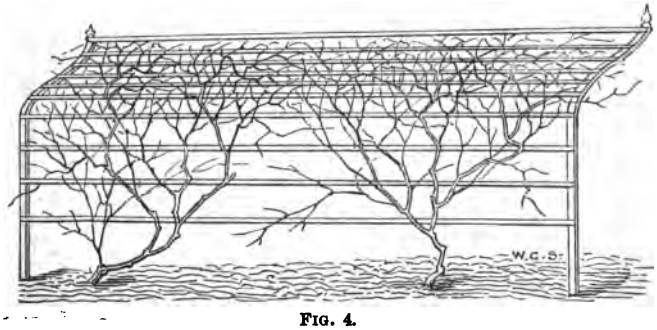

FIG. 4.

In most, I may say all, cases of old vines of this character that I have been called on to prescribe for during the past few years, the bulk of the young wood was at the top of the trellis. If, perchance, a young shoot had started from near the ground and made a rampant growth, and the pruner had courage enough to cut out an old cane, the new one was carried in its place to the top of the trellis and there cut off.

The buds on these young shoots, for some distance from the base, were small and poorly developed, the sap having rushed past them too rapidly to properly develop them as fruit buds; consequently they start feebly, the ascending sap accumulates in the buds at the top, pushing them into vigorous growth, densely shading and impoverishing those below. The consequence is, in a year or two at the most, the young cane is as naked as the old one it replaced. The chief result of this system is little fruit and much shade, and is fast giving way to other and better methods.

In these diagrams, Figs. 5 and 6, I endeavor to illustrate the Thomery, or what is more commonly known in this country as the Fuller system, from the fact that that gentleman, in his book on grape culture some years ago illustrated and recommended it, so that it became exceedingly popular.

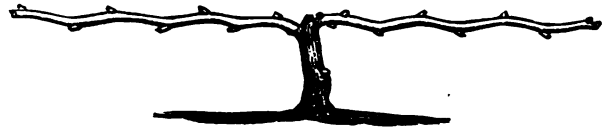

FIG. 5.

Fig. 5 shows the vine at the beginning of the third season, with the arms in position.

Fig. 6 shows the vine at the end of the season, and the crossmarks where to prune.

It is a very neat, tidy and satisfactory method if properly attended to, especially for amateurs. In practice, however, it has been found too much labor for vineyard use to be profitable at the low prices ruling for the fruit for the past few years.

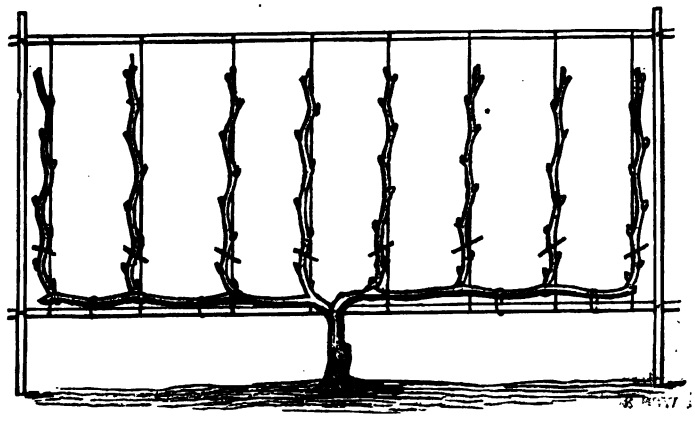

FIG. 6.

In my Fuller's trellis, Fig. 6, the wires are run vertically and put on to accommodate the buds. The height is four to five feet, more or less, according to the taste or fancy of the grower. The pruning in this system is what is known as short spur pruning. The upright canes are cut down to two buds the first year. The next year the canes are grown, and at the next pruning the upper one is cut entirely away and the lower one to two buds. Thus two canes are grown every year, and the annual pruning thereafter is the same.

FIG. 7.

Here is a style of trellis (Fig. 7) I saw in use at Vineland the past season for thousands of vines. It consisted of one wire, supported on stakes two and one-half feet high. It is simple and inexpensive, to say the least, and so low that the masculine genus homo can readily step over it, and is not easily affected by winds.

Fig. 8 shows the style of trellis I use. It is also the one in general use in vineyards in the Hudson River grape region, having superceded the Fuller style on thousands of acres. It is what is popularly known as the Kniffin trellis. My lower wire is three and one-half feet from the ground, and the top one five and one-half feet, but this is a matter each one can regulate for himself. A very desirable feature which recommends it to me is the facility afforded of readily passing under it from one row to another. While the fruit on the lower wire fails to get the effect, beneficial or otherwise, of the radiation of heat from the ground that it would if lower, my theory is, that it gets a better circulation of air and is less liable to mildew and rot, though I have had enough of both these light afflictions (?) for two years past to satisfy my desires in that direction for all time to come.

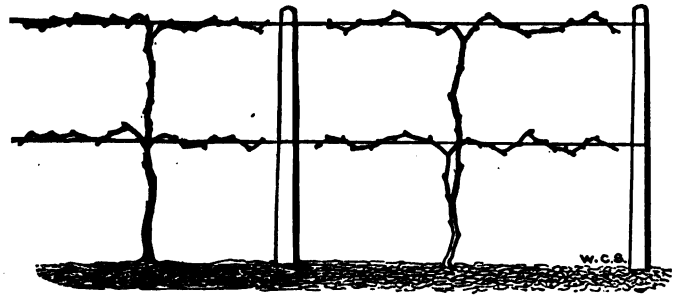

FIG. 8.

The Kniffin system of training and pruning is, as is shown in the vine on the left of the figure, to start two arms at the first wire and two at the top wire, rubbing off all buds between and below the wires, except the four needed for the arms.

If the vine has made a good growth the first season it should be cut off just above the lower wire. A bud on each side is trained along this wire for the lower pair of arms, continuing the top bud on the top wire, rubbing off all others. Why not cut it off at the top wire and grow all arms at once? you ask. Because, if cut there the strongest arms would be there, and you might fail to get good ones at the lower wire; but if cut at the lower one you are sure of good arms there to start with, which you are not sure of in the other case.

My theory is, and sometimes I have had the facts to prove it, that, owing to the natural tendency of the sap to the top, as heretofore alluded to, its course being unobstructed up through one cane, it would not stop in sufficient quantity at the lower arms to supply them with their due share, but hastening on to the top, where it must stop, results in giving the strongest wood growth at that point. To avoid, that, I grow the two canes the second season, as heretofore stated, from near the ground, and divide the current of

sap at that point. (See vine on the right of Fig. 8.) These canes, on reaching the wires, can be pinched off, thus forcing out two lateral buds, to be trained along the wires for arms, or they can be bent down along the wires for one arm, and allow the lateral starting nearest the wire to form the opposite arm, thus forming the arms the second season.

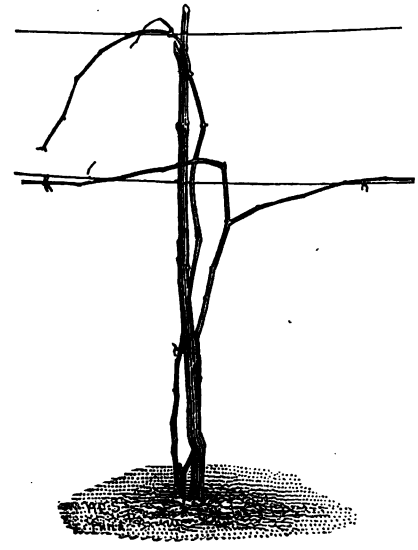

FIG. 9.

Fig. 9, from a photograph, shows a vine of this character. The short vine was pinched off at the lower wire, the arms coming from the laterals, the main cane of the long vine furnishing one arm for the top wire, a lateral the other. I have had vines the second season from planting make the trunk and arms complete, with wood to spare, but they were exceptional cases. On the other hand, I have vines of feeble growth that have been five or six years trying to make a respectable appearance, and have not done it yet, another proof that there are occasional exceptions in all cases.

In pruning, I generally shorten the arms to five or six buds, rarely more, sometimes less, dependent on my judgment of the vigor and ability of the vine, and sometimes I make a mistake at that.

The bending of these arms into their position on the wires tends to retard the flow of sap, and favors a uniform growth of the buds along the entire arm, it is so short; whereas if it were ten buds long, instead of five, the buds nearest the main cane would start feebly, if not fail altogether. That is just where many failures have occurred in the Thomery-Fuller system, before described, in attempting to get too long an arm in one year.

The annual pruning thereafter is to cut away the entire arm, except the branch nearest the main cane. This is bent around and tied to the wire, shortened in to five or six buds, and is the new arm replacing the old one.

The simplicity of this system, and the little labor attending it, are its strong recommendations, and the natural droop of the canes also tensd to check its growth; yet it has some objectionable features. The young shoots of strong growing varieties, when growing at a 2:40 rate, have a feeble hold on the old wood, and are liable to break off with a stiff wind or a heavy shower. In cultivating, if the horse switches one with his tail, or gives it a slight bend in the wrong direction, off it goes, and ofttimes they are the very ones you would like to have saved. To remedy this, I have had good results by running a wire through the posts six inches above the one to which the arms are fastened, or one on either side the same distance above. The young shoots are tied to these, affording the necessary support. On one side of my vineyard there is quite a descent, so that I find it desirable to cultivate both ways to prevent washing. I therefore dispense with my lower wire and run one over the top wire at right angles to it, carry my vines up to the wires and put the four arms at the top, thus getting the same fruiting area as in the other case.

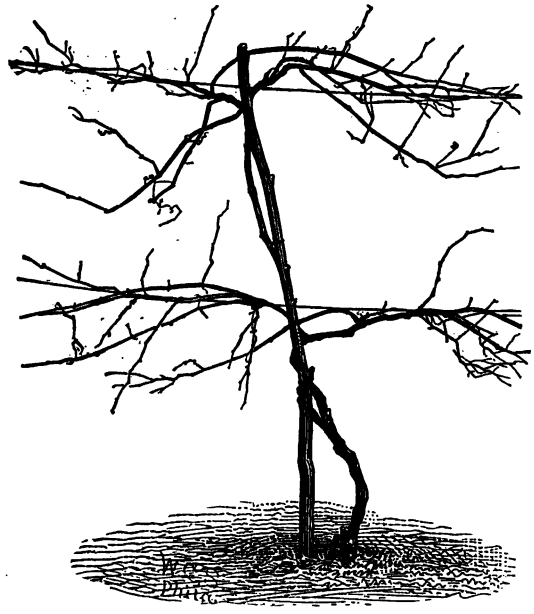

FIG. 10.

Fig. 10 is a reproduction, from a photograph, of a vine in my vineyard, as it appeared last fall after the leaves had fallen and before pruning.

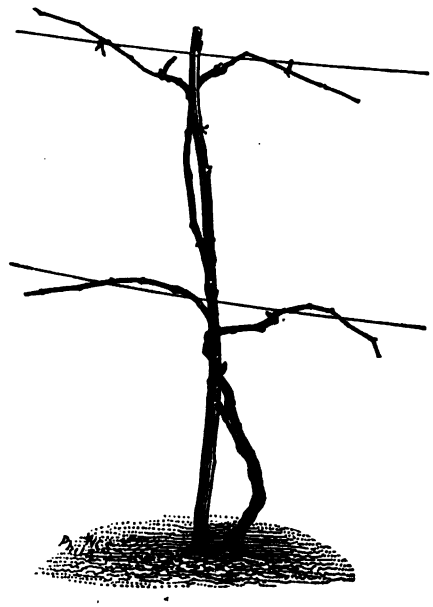

FIG. 11.

Fig. 11 shows the same vine after it was pruned.

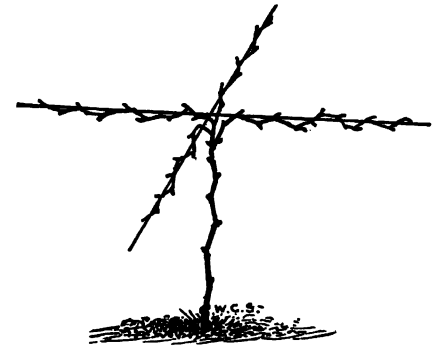

FIG. 12.

Another trellis, well thought of, is to run three wires at the top nine inches apart, the center one for the arms of the vine, and the side ones for the branches, which are trained over them.

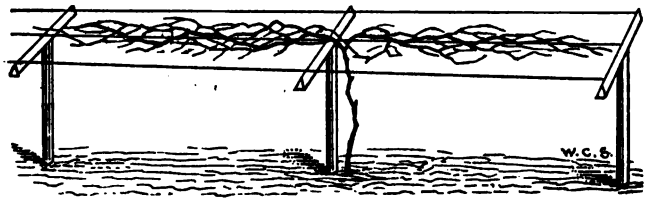

FIG. 13.

Fig. 14 is a sketch of a vine trained with a view to lay it down with ease, and is applicable for tender varieties that will not stand exposure during winter in severe climates.

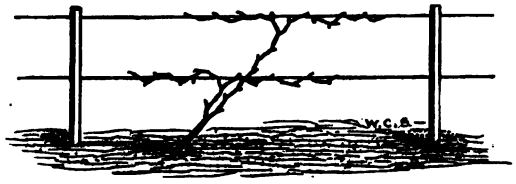

FIG. 14.

It requires a good deal of nerve and moral courage for one accustomed to the old method to cut, or see another cut, a vine so severely. They lament the depravity of the man who would countenance such reckless destruction, but they generally get over it and grant complete absolution when the next fruit crop is ripe, and condone the past. In case of short-jointed varieties, like the Jefferson, I cut the arms to eight or ten buds, removing alternate ones, giving the remaining ones more space. With some varieties, like the Berry, and occasionally in others, the buds persist in growing at right angles with the arms, so that it is sometimes difficult to bend the cane needed for the new arm around to its place, they are so rigid, but a little coaxing in damp weather will generally succeed. Sometimes one is found too obstinate for the purpose. In such cases I spur it to two buds and take the next one for the arm. The spur will furnish the arm for the following year in its proper place. The upper left hand arm in Fig. 11 shows a case of this kind, the cane wanted for the arm turned the wrong way. It was spur-pruned, and the next cane used as the arm for this season, which will be removed entire at the next pruning, and the cane growing from the base of the spur will furnish the arm for next year.

Mention has been made of the tendency of the sap and fruit to the top or extremity of the vines. As an illustration showing the value of this feature, and how completely and easily it responds to the wants of man when intelligently directed, I will give you an example:

A city gentleman, some years ago, had a small yard filled with a few fruit trees that appropriated every ray of sunshine that managed to penetrate it, and he wanted some grapes. After a careful survey of the situation, he concluded, by a little extra care if necessary, the vine might get a foothold and sufficient nourishment from the same sources the trees did. The vine was planted, and as it grew it was trained up by the side of the house in a single cane, to the eaves of the second story, and given a trellis built from the gutter to the roof. An attic window in the roof gave access to the vine for pruning and gathering the fruit, and for years that vine responded annually with a bounteous crop of delicious fruit, beyond the reach of outside depredators. A little "gumption" and Yankee ingenuity did it, and there are thousands of homes far better situated that have no room for a grapevine.

SUMMER PRUNING.

Do I believe in it? I do, most assuredly, and practice it, too. Its objects and advantages in directing the energies of the young vine to the growth of wood have already been spoken of in the treatment given the first and second seasons.

As the vines awaken from their winter sleep in the spring and the buds begin to swell and burst forth, it will be observed that two buds often appear from what seemed but one in a dormant state. The first and simplest operation in summer pruning is to rub off one of these and all superfluous ones, wherever and whenever they appear. A simple touch of the finger will do it. The weakest, and generally the lowest one, has to go. If the buds, from any cause, start feebly, the sooner this is done the better for those that remain; but in cases where they start strong and vigorously, indicating a superabundance of steam under high pressure, it is well to let some of it escape through these channels, and defer their removal till the embryo clusters have appeared. If these shoots have grown a foot or a foot and a half long, no matter; the check to the vine will be the greater, and their removal none the less demanded. The only trouble likely to attend delay in their removal will be the want of moral courage in the operator. It is apt to hurt one's feelings to destroy so many prospective clusters of fruit, and the temptation to allow them to remain is very strong. The remaining shoots are pinched off at one or two leaves beyond the last cluster of fruit and all laterals are stopped in the same way as recommended for the young vines to one leaf.

These bearing canes and laterals after recovering from the check thus given will soon recover and make a fresh start in wood making, and the pinching process is repeated as before, leaving an additional leaf each time. The effect of this treatment is to retard the sap and retain it where it is needed for the full development of buds, leaves and fruit. The leaves remaining increase in size much beyond their normal proportions, and I have a theory that a strong, vigorous leaf of this kind is most capable of resisting

the attack of mildew, and the larger the leaf area next the fruit, the larger and finer the fruit will be.

This pinching process also results in full, plump, and well developed buds on the canes to be left for the next year's fruiting, as you will see from the specimens I have brought to show you how the pruning is done. Some advocates of long pruning urge as a reason for it that the third and fourth buds on a cane produce the best clusters, and some even assert that the axillary buds, those that emanate at the junction of the young cane with the old wood, will never produce fruit.

That depends altogether on the treatment the vines have received. If they have been allowed to grow at random and take care of themselves, I admit they seldom fruit, purely from lack of development. The sap being allowed to pursue its natural course unmolested, it has no time to stop and pay proper attention to these buds; but, with judicious summer pruning, these base buds are equal to the emergency. In fact the short spur system heretofore described depends absolutely for success on this summer pruning.

I know a very successful amateur who has vines ten years old treated on this system, some of the spurs on which are not over one and a half inches long; indeed, in some instances they are so short that the base bud seems to start almost out of the old wood, and yet this bud will give as good fruit and as large clusters as any, and does so year after year, and it is simply due to this full development resulting from summer pruning.

Mr. President, I am done. The subject is a prolific one. Volumes have been and may be written on it. I have merely touched a few points on the borders in this desultory manner. Your Secretary said he wanted the paper brief and practical. If it possesses no other merit I trust in these two features, at least, it "fills the bill." Regretting the subject had not fallen into abler hands, and thanking you for your kind attention, I am your humble servant and co-laborer.

NOTE.—The cuts illustrating this article were drawn and engraved expressly for it by Scranton & Chadwick, designers and engravers, No. 25 North 7th street, Philadelphia, Pa.

DISCUSSION ON GRAPES.

Mr. Hollister, of Missouri—Where grapes succeed they find a ready and remunerative demand. Although the Concord and other hardy grapes often sell at from one and a half to two cents per pound, in our city markets, they yet pay the producer better than corn or cotton.

Mr. Wilcox, of California—Grape culture is a leading interest in California. Our table grapes find ready sale in the Eastern markets, and from our poorer soils wine grapes are profitably grown. The European grapes are now thoroughly acclimated in our State.

They do not require much moisture, especially if grown near lakes, where the air is more or less humid, but they must be sheltered from high winds.

Mr. Hollister—Our best commercial grapes are the Concord, Catawba and Delaware. White grapes bruise and discolor.

Mr. Campbell, of Ohio—It is not my experience that the Catawba is growing earlier from year to year. I have not had a ripe Catawba in twenty-five years. No one grape will succeed in all localities. To find what will succeed we must experiment for ourselves. We can not grow the European grapes in Ohio. I should think they ought to succeed here in New Orleans. They are subject to mildew and rot. Grapes succeed much better on a wall than in the open garden. A Delaware vine on a wall has borne every year for twenty-five years, while in the open air they have not borne more than one-third of the years. The Catawba will ripen on a wall, but not on a trellis. I have never had the Delaware to rot. It will sometimes mildew. If it did not it would be a most valuable grape. White grapes will do for near markets, but will not bear long shipping. The Pocklington is later, more foxy and sweeter than the Concord.

On motion the Society adjourned to meet at 1 : 30 o'clock P. M.

Fourth Day—Saturday.

AFTERNOON SESSION.

DISCUSSION ON THE GRAPE—CONTINUED.

Dr. Hape, of Georgia—I favor bagging grapes as a preventive of rot and other diseases.

Mr. Caywood, of New York—There must be a slit in the lower end of the bag or it will hold water and thus injure the fruit. Barn-yard manure is not good for the grape.

Dr. Hape—I use cloth bags instead of paper.

Mr. Cushman, of Ohio—I do not see how the practice of bagging grapes can be made to pay. It is too tedious and expensive for market purposes.

Mr. Williams, of New Jersey—I failed last year by bagging too late. This year I bagged my grapes earlier, and was successful. It does not pay me to bag the Concord; the fruit does not sell for enough to pay expenses, but it pays me well to bag my finer varieties. The grapes do not crack when properly bagged. My bags cost $1.15 per 1,000.

Mr. Caywood—I do not condemn bagging. It is impracticable; that is all.

Mr. Munson, of Texas—It is important to know when to put on the bags. It must be done very early. This a man in our State has proved by the use of salicilic acid.

Mr. Pierce, of Ohio—Dr. Jewett, of our State, has tried carbolic acid, sprayed on, and finds it a preventive of rot.

President Earle—I know from experience that it pays to bag grapes. It costs about a half cent a pound to bag them.

Mr. Williams—The President has alluded to the saving of grapes from birds. In this respect alone it pays to bag them.

Mr. Ohmer, of Ohio—They are much easier picked, besides the great satisfaction of having something worth picking. But you must not omit to open the lower end of the bag to let water out.

Mr. Cassell, of Mississippi—What size bag is best?

Mr. Williams—I use two-pound bags, such as grocers use in putting up goods.

Mr. Cushman—If you bag the grapes you will bag the money.

Mr. Kellogg, of Wisconsin—Spring and fall frosts are our greatest trouble. There is nothing but the Concord type that will succeed in our State. Our most successful crops are from improved vines.

Mr. Leeper, of Illinois—Grapes do not pay in Illinois. From Fort Madison to St. Louis they fail to succeed.

Mr. Durand, of Missouri—I would ask Mr. Williams how he would prune an old vineyard to put it in good shape?

Mr. Williams—You must cut back, so as to induce the growth of new wood, and then you will get fruit. It takes some years to reclaim an old vineyard.

Dr. Hape—I should like to know a good fertilizer for the grape.

Mr. Hoffman, of Kansas—I have used wood ashes with good results. A neighbor mulched the ground heavily about his vines with old corn-stalks, which had a good effect.

Mr. Cook, of Michigan—Awnings over vines have been recommended. Has any one experience in the use of awnings?

Mr. Caywood—I have tried awnings with good results. This is especially true of vinifera seedlings. The fruit on branches under the awnings was sound, while outside the mildew and rot prevailed.

Mr. Williams—The experience of a neighbor of mine corroborates the foregoing. I have used various commercial fertilizers with a view of testing their effects on the grape. Barnyard manure with wood ashes is as good as any of them.

Mr. Kendel, of Ohio—Bone dust is admirably suited to the grape. It is of no use when applied to the surface, but must be applied in the furrow when plowing. Fifty dollars worth of bone dust produced more than one hundred dollars worth of grapes.

Mr. Cook—Carbolic acid mixed with soapsuds will not harm the foliage when sprayed on.

Mr. Kendel—Mix carbolic acid with glycerine and you produce perfect suspension.

Mr. Caywood—One hundred bushels of unleached ashes per acre will do no harm.

RESOLUTIONS CONCERNING THE EXPOSITION.

Mr. Lindley, of North Carolina, offered the following, which, after remarks by a number of gentlemen, all of whom cordially supported the resolutions, was adopted:

WHEREAS, The present meeting of the American Horticultural Society is being held within the buildings of the World's Exposition, at New Orleans, La.; and,

WHEREAS, Various rumors, adverse to the best interests of said Exposition, have been widely circulated throughout the country, much to the injury thereof; therefore, be it

Resolved by the American Horticultural Society, That the Exposition now in progress here is, in all respects, a grand one, and worthy of the careful study of the American people, if not of the whole world.

Resolved, further, That the displays in the Horticultural Department alone, and especially, are the finest and most instructive ever presented to any people on the globe, and should be visited by all lovers of the cause we represent.

Resolved, further, That the charges of extortion upon visitors on the part of citizens of New Orleans are false.

Mr. Campbell, of Ohio, presented the following, which was also adopted:

THAT WHEREAS, It is becoming every day more apparent that the managers of this great World's Exposition of the skill, industry, manufactures, and also the agricultural, horticultural and mineral products and resources, not only of this country but of the world, did not at its inception realize the magnitude of the work it had undertaken, and that it has grown upon their hands beyond their ability to control financially; and,

WHEREAS, It is also apparent that the people individually have not shown a proper appreciation of this meritorious and magnificent work, we, the members of the American Horticultural Society, in convention assembled, hereby declare that we regard this Exposition eminently worthy of the encouragement and support not only of the people of the United States but of our national government, and that we believe the national honor requires that this great enterprise shall not fail for want of means to carry it forward to a brilliant and successful issue; be it therefore

Resolved, That the American Horticultural Society earnestly recommend that the government of the United States shall further aid the management of the World's Cotton Centennial Exposition by the loan of $500,000, or of such sum as shall be necessary to carry its undertaking to a successful conclusion.

Mr. Kellogg of Wisconsin, moved that—

We find the Exposition so far completed that we advise our friends to postpone their visit no longer, but to come and see the greatest Exposition the world has ever seen.

Also, that we believe a more liberal accommodation to visitors by railroads, and returning by different routes with stop-over privileges, will greatly increase the attendance.

The Society then adjourned until 7 P. M., to meet at the house of President Earle. In the meantime the members paid a visit in a body to the Dairy Division of the Exposition by special invitation of the superintendent, Mr. Charles Marvin.

Fourth Day—Saturday.

EVENING SESSION.

At 8 P. M. the Society assembled in the parlors of President Earle as per adjournment.

On calling the meeting to order President Earle said: "Ladies and gentlemen, I find it hard to put an end to such social conversation, but we will give you something good in its place. I will now introduce Mr. Lyon, of Michigan, who will treat the subject Association in Horticulture."

ASSOCIATION IN HORTICULTURE.

BY T. T. LYON, OF MICHIGAN.

The advantages of association, in horticulture, as in nearly if not quite every other pursuit, especially in modern times, are so important and obvious in very many respects, that extended notice seems almost if not altogether needless.

We may therefore be excused if we invite more especial attention to some of the more remote or less appreciated of these advantages.

When, in the autumn of 1848, one of the earliest of American Horticultural Conventions, representing an extended region, convened at the city of Buffalo, the members were greatly surprised that its committee, charged with the duty of framing a list of fruits to be recommended for general cultivation, were unable to agree upon even half a dozen varieties of apples for this purpose.

Subsequent more extended collation of experience has still more strongly emphasized this difficulty, compelling the abandonment of the effort in this direction and the substitution of State lists, with even the additional need of the division of States into districts, with either distinct or modified lists for each district.

But the benefits from association in this direction are often exceedingly slow of realization, both from the far too common neglect to become informed, on the part of very many persons, and from the long time required to change unsuitable varieties when once planted. Indeed, if we may be permitted to base our conclusion upon observations within a comparatively narrow field, we must conclude that, between a lack of the requisite knowledge and the failure to properly apply what is actually known, fruit growers, as a class, annually receive little more than half the income due to their investments, if judiciously made, and wisely and efficiently followed up.

To illustrate: We have not unfrequently, in Michigan as well as in other

States, not in farm orchards only, but even in those planted for commercial purposes, been pointed to a row or a block of trees, planted perhaps with little care or thought as to the variety, with the remark that these have proved more profitable than perhaps ten times their number taken anywhere else in the orchard.

Again it is not altogether unusual to see a farm orchard apparently grudged the space it occupies; and the ground taxed with the production of farm crops, in addition to the orchard crop, till, by a process of starvation, the latter becomes as really valueless as it is esteemed to be by its owner.

Some years since the Horticultural Society of Michigan, while doing pioneer work about the State, discovered that, while its meetings were well attended, and while much interest was manifested during their continuance, it remained almost without recognized membership, while the apparent good resulting from its meetings seemed, in a considerable degree, ineffective and evanescent. Much thought was given to the matter, ultimating in a plan for the organization of a system of auxiliary local societies, reporting periodically to the parent society, and entitled to all the advantages of such membership; while, upon invitation, the periodical meetings of the parent society are held with one or another of these auxiliaries, and, in so doing, are made to serve a valuable purpose, in the increase of their efficiency and the extension of their membership.

The results of this arrangement have, so far, proved highly satisfactory, although experience develops occasion for still farther improvement. Some system of occasional or, perhaps, even periodical visitation, or other equivalent process, seems needful as a means of maintaining and even increasing the efficiency of these auxiliaries, as well as of inaugurating others, especially in localities in which may be found the needful material, but lacking the innate, self-leavening stimulus.

Such increase of numbers and efficiency is the more essential, since the parent society looks to these auxiliaries for the collection of the needful information to be employed in the revision of its catalogue of fruits, as well as for much of that collated in its annual volume of transactions.

We are happy to know that in many other States equivalent and, perhaps, even more effective associational efforts are in progress looking to equivalent results.

The recently inaugurated and apparently popular effort of the American Pomological Society, looking to the simplification as well as purification of the nomenclature of fruits, seems likely to prove an important as well as a beneficent result of associational influence, since the contemplated change, should it become general, would not only very essentially simplify and purify our pomological literature, so far as the past is concerned; but, as we anticipate, also strike at the root of vicious practice in the future, by the subsequent avoidance, in the naming of new introductions, of vulgar and redundant names, which in so many cases have proved the occasion for the popular custom of cutting off such redundancy, or for the employment of local synonyms.

In connection with this subject, we may be allowed to strongly commend to this Society the propriety of adopting and enforcing, in its practice, these or equivalent rules, not merely in their application to pomology, but also and equally in their application to horticulture generally; if not for the simplification of the nomenclature of the past, at least for the purification of that of the future.

The tendency to redundancy in names is perhaps more decided in plants of French origin—a fact possibly attributable to the very vivacious and demonstrative characteristics of that language and people. Since this Society is, in fact, acting the role (although hesitating to assume the title) of a national organization, it might (perhaps in association with the American Pomological Society), with the utmost propriety, open correspondence with the leaders of French, and even of European horticulture, looking to the adoption and inauguration of a system of equivalent international horticultural rules covering this entire field, thus securing the fullest harmony in such matters—a result most earnestly to be desired.

Such action becomes more desirable on account of the more modern and nearly spontaneous development of the practice of horticultural home adornment among our people, both within and without the dwelling. In such cases, generally, the planter sadly needs training. together with general information on the subject, not only in the arrangement and laying out of his grounds, but also as to the choice of plants for the purpose, as well as for the selection and management of the appropriate plants for winter greening in living rooms and private conservatories.

Nothing will more effectively subdue, refine and elevate the boisterous rowdyism of Young America, while in the transition state between childhood and manhood, than to surround him, during this most impressible period, with beautiful trees, plants and even flowers, and by associating them, in his mind, with the ideas and responsibilities of ownership and the thoughtfulness that such consideration naturally inspires. Children thus taught, during their earlier years, to value, and hence to study the productions of nature, will, as a natural result, develop into better and more useful citizens. Hence the importance of surrounding the school-house, within whose walls the minds of the masses are so largely molded, with pleasing, elevating and refining influences, in the form of trees and plants, which will be found all the more useful for this purpose if planted, cared for and owned by the children severally. We can scarcely bring associational influence to bear upon a subject of more imminent importance to the future of our country and people.

That heretofore dreary and neglected corner of the average farm, the kitchen garden, has, we fancy, already begun to feel the influence of occasional rays from the associational luminary; still, however, except in occasional cases, it seems to be regarded merely as a spot on which to bestow an occasional spare half hour, which is likely to recur too rarely for the satisfactory or profitable management of the plat in question.

Judging from observation, it is our impression that scarcely one farmer in one hundred gives the kitchen garden a recognized place in his system of farm work, while still fewer have any proper conception of the pecuniary and dietetical value of the possible products, or of the practicable and profitable successions of which such a plat is susceptible. Association has here a highly important work yet to perform.

But broad as may be the horticultural field proper, it is so complicated with difficulties growing out of the attacks of fungi, including the bacteria of modern science, together with the depredations of insects, birds, etc., whose influence, as a whole, may prove to be either beneficial or hostile, that he who would keep abreast with the times, and make intelligent and profitable use of the discoveries and improvements of the day can hardly do less than to associate himself with those engaged in studying the economical phases of the analagous sciences, to which he may very properly add chemistry and even geology, agriculturally considered, from each and all of which he may hope to derive important aid in the selection and treatment of soils, and in resisting the various and persistent inroads of these various enemies upon his growing crops.

But valuable as may be the aid of association in horticulture, it is not altogether devoid of dangerous quicksands and breakers. Men are prone to accept their conclusions at second hands, instead of collating facts and drawing their own conclusions. The commercial orchardist prefers to plant showy and productive varieties, with little regard for flavor, since the markets generally p efer such; and since these are almost invariably vigorous growers as well, nurserymen prefer to grow and sell trees of such varieties. Without apparent consideration of these facts, those who plant for home use, to whom fine quality should be the dominant object, and apparently mainly anxious to get the largest and finest tree for the money, far too often accept the interested advice of the nurseryman, or that of the commercial grower, from the standpoint of profit only, accepting a Flemish Beauty or a Bartlett pear in place of a Bosc or a Seckel, or a Pennock or Ben Davis instead of Pomme Gris or Hubbardston, and filling his cellar in winter with fruit such as can hardly be esteemed desirable as a treat for the family or friends, except when nicely cooked and well reinforced with—glucose.

So long as it shall be practicable to collect together a knot of growers and dealers, who, after a pow-wow over a newly discovered novelty, in which, perchance, each may have become directly interested, to, by mutual puffing, give it a good send-off before the public; or even while it shall be possible to accomplish such result upon the commendations of distinguished experts, in the absence of repeated and lengthened trial, it can hardly be otherwise than that our modern avalanche of trash in the form of new plants and fruits will continue, if indeed it shall not even increase in both volume and worthlessness.

Do not the horticultural magnates of the period owe it to themselves, as well as to a trusting public, to see to it that effective measures are devised

to relieve our horticultural literature of this worthless material, and our pockets and our grounds as well, from such bootless expenditure and labor, by strangling it while yet in its incipiency?

The process through which so important and desirable a result may best be accomplished it is not my province to determine, but the great and ever increasing mass of worthless material of this character annually foisted upon a too credulous public, together with the cost of purchase, propagation and cultivation, represent an amount of expenditure so vastly disproportioned to the resultant values, that, while we, doubtless, should most heartily encourage the origination and introduction of worthy novelties, their introduction to the public should be most carefully guarded, as a means of securing the rejection of the unworthy.

DISCUSSION ON MR. LYON'S PAPER.

Mr. Caywood, of New York—The benefits of association are well known to all, and to no business will more benefits accrue than to the horticulturists. Co-operation is a great help to us. I desire, specially desire, to ask how can we dispose of those worthless new fruits mentioned in the paper?

Mr. Wilcox, of California—Twenty years ago I had experimental gardens. I tried everything that was recommended. I found in the Atlantic States a class of very good fruits; in the central States another. I found that if I took something without indorsement I was likely to succeed; but after all I find it best to cultivate varieties suited to our climate rather than to run after introduced sorts. I find that much depends on soil, locality and climate. New Jersey and Ohio can not make rules for each other's government. Conference will assist us to reach general knowledge in these matters.

Mr. Hollister, of Missouri—If you will go to the grocer's stand and find what he demands, and plant such varieties, you will succeed.

President Earle—We must also consider the productiveness as well as the salable qualities.

Mr. Williams, of New Jersey—In our State we have found it most difficult to agree upon a fruit list, owing to the great variety of soils. We have reduced list areas to the size of counties, but even then growers won't agree. In the county of Essex one man made more money on the Great American than on any other vari-

ety. This goes to show the frequent *local* usefulness of a variety and its *general* worthlessness.

Mr. Beatty, of Kentucky—Horticulturists deprecate the growing of many varieties, yet they offer premiums on collections of one or two hundred sorts, thus encouraging what they seemingly condemn.

Major Evans, of Missouri—In reference to strawberries, we can not safely make lists for our neighbors. I want also to indorse the recommendation of planting school grounds.

President Earle—Large collections afford good opportunities for comparative study. In general, however, I think the principle of offering premiums on large collections unprofitable. In practice, the smaller the list of sorts planted the greater the profits.

Mr. Munson, of Texas—Every professional horticulturist should have an experimental plat. I find such great variety of soils within three miles of my place that the experiments of one farm will not indicate the proper treatment of an adjoining farm. This is especially the case with the strawberry. Our best nurserymen, like Ellwanger & Barry, have their experimental plats. It is in this tedious way, only, that we can reach the desired accurate knowledge.

Mr. Van Deman, of Kansas—All our cultivated fruits have once been new, and probably pronounced humbugs by some with whom they have not been successful. We must each *sift the list* for ourselves and for our own locality. In Kansas we have inaugurated "Arbor Day," in which we meet to plant and adorn our school grounds. This is already showing favorable results.

Mr. Ohmer, of Ohio—The good results of local and State horticultural societies are already very apparent in our State. This may be recognized, both in a social and educational sense throughout our State.

Prof. Lemmon, of California—With the botanist, experimenting is the key-note to success. A plant is always ready to change its habitat for a better one. By a constant warfare in nature, plants have often been driven to their present place and not unfrequently produce better than before. We must have the best, and this we can only reach by experimentation.

Dr. McKay, of Mississippi—I knew but little of good varieties in 1860. I first consulted a grower in my own neighborhood, and from his experience have been greatly benefited. If we will ignore the tree peddler, with his overfed samples and colored plates, we will save ourselves many disappointments. It will be far better for us, if we only avail ourselves of our neighbors' experience. As a rule, we plant ten sorts that prove unsuccessful where we do one that gives satisfactory results.

Mr. Smith, of Wisconsin—If we were all to become experimenters, what a "heaven on earth" it would be for tree peddlers! In twenty years I have spent more than $1,000 for new strawberries alone, and have only found *one* good variety. I fully agree with Dr. McKay, that we should go to the honest neighbor and nurseryman for advice. We may thus not only cease to experiment, but may be enabled to grow something profitable. For every farmer to be an experimenter, unless he has a long and full pocket, is to bankrupt him both in pocket and in fruit.

Mr. Munson—In answer to Mr. Smith, I would say that I would, to a great extent, restrict the work of experimentation to the nurserymen. It is especially their duty to study the suitability of sorts to their respective localities.

Mr. Cook, of Michigan—We need not trouble ourselves about new fruits. They usually get into the hands of men who will take care of them. Horticultural associations are now educating the people to the point where the work of selecting may readily go on. The voted fruit lists of the several State societies, which are carefully considered, will be safe guides to the planter. An important question for us to consider is how to replace poor sorts in old orchards with better ones. Shall we resort to top grafting?

Mr. Beatty, of Kentucky—Our society fruit lists are not read by the general public, while our exhibition of fruits presents itself to thousands of visitors. A premium apple, if fine looking, may deceive and mislead the planters.

Mr. Van Deman—Every horticulturist is an experimenter, and will be in spite of what we may say. We should recommend intelligent experiments, not haphazard. Premium lists should

specify for what purpose the exhibition is to be made. Then our fruit exhibitions will convey more useful knowledge.

Mr. Hoffman, of Kansas—In answer to Mr. Caywood's question, I would say lay the ax at the root of all worthless varieties.

Maj. Ragan, of Missouri—A creditable horticultural exhibition can not be made to include only a small list of varieties. If, in making up an exhibition, we were to confine ourselves to only ten varieties of apples visitors would feel disappointed. At the Kansas State Fair last fall fruit lists were reduced to only twenty-five or thirty sorts, yet in making the awards I, as one of the committeemen, felt disposed to favor the larger collections, as of vastly more interest to all. It is not safe in planting to confine ourselves to a few varieties. Those that succeed well this year may soon fail, and thus we might find ourselves seriously disappointed. Then, again, we find tastes differ. One customer will want Ben Davis, another Grimes' Golden. Even among professional fruit growers, we will find a great diversity of opinion on as simple a problem as "What are the best ten varieties of apples?" Nurserymen should always plant specimen orchards.

Mr. Smith, of New York—If nurserymen, instead of catering to an unwise demand of their customers, would themselves only cultivate such sorts as they knew would be profitable they could very easily correct this inclination to multiply varieties and to experiment, on the part of the ordinary planter.

Mr. McClave, of Michigan—Some one produces a new variety. He obtains testimonials from his neighbors and sends it out under flaming colors. The people take the bait. This result will continue to flood our country with new varieties.

Mr. Kellogg, of Wisconsin—The "honest" nurseryman consults his own interest by selling off his stock. One of them said to me: "I am going to take orders for what the people ask for, and send them just what I think best."

Mr. Cassell, of Mississippi—As a nurseryman I often cultivate varieties that will not succeed in my own neighborhood for customers in neighborhoods where such varieties will succeed.

Mr. Durand, of Missouri—An experimentor should only test varieties which promise to succeed in his locality.

Mr. Munson—The conclusion seems to be, experiment; the nurseryman most, the fruit grower less.

President Earle at this juncture called upon Mr. Munson for his paper on American grapes, remarking that although late in the evening, and, in the regular order, the last session the Society would hold, he did not wish to see the meeting adjourn without having so valuable a paper as he knew this one to be. This led to some discussion, resulting in a proposition to hold adjourned meetings during the following week, after which, on motion of Colonel Brackett, of Iowa, it was resolved to hear Mr. Munson's paper on Tuesday morning next, in Horticultural Hall.

The Society then adjourned to meet on Monday evening in President Earle's parlors, the previous day to be spent in an excursion to Shell Beach, as heretofore arranged for.

ADJOURNED MEETINGS.

PRESIDENT EARLE'S PARLORS,
MONDAY, January 19, 8 P. M.

President Earle called the meeting to order, and introduced Mr. Kellogg, of Wisconsin, who read his paper as follows:

SUCCESS AND FAILURE.

BY GEO. J. KELLOGG, OF WISCONSIN.

MR. PRESIDENT, LADIES AND GENTLEMEN—Failure in horticultural pursuits is nearly always the first step to success; failure the rule, success the exception.

Let your mind's eye go back in your own experience; scan closely the ventures, experiments, and investments of time and money, and how much of it has paid? Would not the same efforts put forth in almost any other calling have given affluence where you have only gained a competence?

Such has been my observation, except in certain classes of horticultural products, illustrated by those firms who are sending out millions of plants, trees, etc., to bless the land, but more particularly their own pockets.

The great causes of failure to the fruit grower are the want of adaptation of varieties to soil, climate, elevation, site, proper cultivation, remedies for insect depredation, proper handling of fruits, and often the lack of a good market.

Suppose a young man goes West, and plants a thousand Greenings and other choice favorites on alluvial soil? You know the result; some of you have been there After a failure of twenty years' experience, and having studied the horticulture of the State, suppose he plants one thousand trees on the most approved site, soil, and location, of such varieties as are recommended by its State Horticultural Society. After the winters of 1856, 1864, 1873, 1882, and 1883, what has he left? Better by far had he been raising white beans all these thirty years.

Suppose he has money, grit and muscle left to try again, and he plants only one or two of the most profitable iron clads that have stood all tests. After eight years of care and culture they promise an abundant harvest, the gouger or apple curculio has taken note of all this, and from the time the fruit is the size of a pea he has been judiciously thinning, and instead of 5,000 bushels from the 1,000 trees he gets just eighty bushels of marketable fruit.

This is no overdrawn picture. One of our most honored horticulturists of Wisconsin has an orchard of 500 nice, healthy Duchess of Oldenburgs, eight years planted; in 1881 they gave him forty bushels, the two following seasons about the same, and last season the promise was five bushels per tree, or 2,500 bushels, but he gets only twenty bushels of good apples, and no apparent cause except this insect pest.

You say poison him; well, do it. We have used arsenic pure and London purple so weak it did no good and so strong that it killed all the foliage, and yet not a perfect apple in a bushel. Applications from blossom time till the fruit is the size of a filbert.

Verily success in apple growing is a failure; a few locations, best varieties, judicious culture, vigilant watchfulness, and the bull dog grip may and does often pay.

Adaptation is so varied in Wisconsin that it is almost impossible to give a list of varieties without going over the ground. First class Rhode Island Greenings were sold the past season at $1.00 per barrel, grown six miles west of Lake Michigan, in Krusha county, while in the central portion of the State only about ten iron clads remain, and only one of these winter.

It is only safe to plant such varieties as on like soil and location are successful. In the newer portions of the State and the general farm location plant Crabs, Duchess, Wealthy, Wolf River, McMahan and Golden Russet, and go slow; also plant the seed of these kinds and hope on.

PEARS.

The most profitable and freest from blights are those trees that never leave out. I know of one Flemish Beauty tree in Rock county that has paid for planting in good and continuous crops for years, and some of you have heard of the wonderful pear orchard near Green Bay; there are thousands of acres along those pine bluffs worth $200 per acre to grow pears, and to a stranger apparently good for nothing else.

Remember adaptation is the key to success; no doubt our best apple lands are the mountainous regions of Baraboo Co., where there are tens of thousands of acres that will grow just as fine fruit as is here on exhibition. Go and see and take notes of those collections from our State.

PLUMS.

Our Wisconsin experience with plums is about equal to pears for profit, although in my early planting I had Lombards bear to breaking year after year; the curculio and hard winters have made all the better class unprofit-

able, and we have been forced to look toward the best native seedlings; with the advent of the Miner or Hinkley, and its success at Galena, Illinois, its dissemination was rapid; in but few locations is it anything but a horticultural nuisance.

Wild Goose, from my experience and observation, bears about one plum in ten years, while the wonderful "Bassett's American" is a humbug of the first water; Weaver is subject to the black knot and has been discarded; De Soto is the best we have found. Other new varieties are blowing their horns, and the horn part may be a success. Plum culture for profit is a failure.

CHERRIES.

About every third year we raise nearly enough for the "dear little birds." The three varieties they like best are Early Richmond, Red English and Late English Morello. These give a succession to other fruits, and no doubt save the life of many a songster. Therefore cherries are both a "success and failure."

GRAPES.

A few varieties, on good locations, with proper care and favorable seasons, and no other hindrances, are a success. Of varieties there is no end. For general planting Concord leads the host, only because Worden and Moon's Early are comparatively high-priced and not within the reach of all who plant large quantities. I know of but one man who prefers Concord to Worden. My observation leads me to the conclusion that no variety of good quality will succeed in the Northwest that has not the leaf and health-enduring habits of the Concord. I don't think that even $2.00 or $5.00 per vine will insure adaptation and productiveness; the high price has never helped the kind one bit. The causes of failure would fill a volume, while the instances of success, outside the Concord type, could be written on your thumb nail.

Small fruits are a success under good common-sense cultivation and a principle of let alone new varieties. If one hundredth part of all the lies told in the last ten years had been true we should all have retired from business ere this, with a life-long competence.

What have we since the advent of the Wilson among strawberries that is likely to take its place? The cry is lo! here and lo! there. Everything is low but the price of the new comer, who is tried and found wanting; perhaps in his native neighborhood he may have performed wonderful antics.

The Wilson, in our own State, has produced over four hundred bushels per acre, actual measurement, and in small gardens at the rate of eight hundred bushels per acre, and I know of but very few instances where any other variety has exceeded this amount, even on a square rod. I might enumerate kinds. You know of the failures, and if any of you can report success, and put your finger right on the figures that were made at the time, and no guess work, that is what we want to know; we don't want to grind anybody's ax or dull anybody's hatchet.

Our most successful grower of small fruits in Wisconsin, who has probably grown more strawberries than any other two men in our State during the last twenty-five years, wrote me, December 29, that he "had no very striking records of success, but could show some stupendous failures." He said: "Had I stuck to the Wilson, adding Downer's Prolific and Crescent, and left alone the novelties, I would have been many thousands of dollars ahead now." With his culture "Wilson in the last twenty three years has seldom gone below 5,000 quarts per acre, and often as high as 7,000 quarts, good dry measure," and during that time "has paid a net profit of not less than one hundred and twenty-five dollars per acre." "Last spring, with the destructive frosts of May 29 destroying one-third of his Wilsons and one-sixth of his Crescents, they alone paid a handsome profit." He is still looking, like the rest of us, for the "coming strawberry," and continues to plant "pistillate Bobs, Jumbos, and Sally Marias."

We are ever hopeful, ever expectant. We believe in raising strawberries that will yield 1,000 bushels per acre. We have not yet reached that standard, although we have very often had strawberries larger than pumpkins in June.

Hamline Hodgen picked of Countess in 1881 239 quarts in one day; June 28, 1882, he picked 112 quarts in five hours. H. H. Cowles, from five Crescents planted in 1881 and their increase, picked four bushels in 1882. One hundred plants of any good variety, with their increase, ought to give 500 to 1,000 quarts the next season.

Raspberries have always paid for care and labor bestowed, and while there are so many good paying kinds that are well tried, we do not care to invest heavily in novelties. We know of nothing so sure of a good crop every time unless it is the

BLACKBERRY.

We prize Snyder for early, Stone's Hardy for late, and Ancient Briton for shipping. The severity of our winters has compelled us to cover the bushes with some protection. At Ripon, Wisconsin, the most extensive blackberry cultivation is successfully carried on by this mode.

C. H. Hamilton writes me December 30, 1884: "The average crop of Ancient Briton by the acre is from 4,200 to 5,000 quarts, and in 1883 the lowest price was 12½ cents, and most of the crop brought 15 cents per box; crop of 1884 averaged 10 cents per box."

He says: "The cost of laying down, covering with earth, removing the dead brush, uncovering and putting up in spring and replacing the wires on each side the row will not exceed one cent per bush. Two men will cover one acre per day."

With this protection we consider blackberries the surest crop of fruit we have. The mode of covering is by loosening the earth on each side the bush with a fork and bending in the root, bending all one way; with the uncertainty of our winters we find it pays to cover even Snyder.

YIELD OF ANCIENT BRITON.

C. Kinsman, Fremont, Wisconsin, in 1882 picked 210 quarts from nine plants three years old.

George H. Robbins, Plattsville, Wisconsin, in 1883 picked ten quarts per bush; in 1884, 600 quarts from sixty bushes four years old, and sold at 15 cents per quart.

Other instances I might give of success and failure; is it true that ten instances of failure can be given to one of success?

DISCUSSION ON MR. KELLOGG'S PAPER.

Mr. Roe, of Wisconsin—My experience with the blackberry fully corroborates that of the writer. The Ancient Briton is a valuable blackberry with us. The Wilson strawberry has not gone back on us. The Manchester also does well in Wisconsin. I must take exception to his statements in regard to apples. The Fameuse and Utter's Red are favorites with me. I would add to his limited list of grapes the Delaware, the Duchess and the Lady. The Champion passed the trying ordeal of 1883 successfully, when almost all others failed. The Massasoit also does well with me.

Mr. Peffer, of Wisconsin—I am acquainted with the orchard of Duchess referred to. It is one of our most valuable apples.

Mr. Kellogg, of Wisconsin—A large orchardist in our State says the Duchess would do if it were not for the apple curculio. This is near Milwaukee, where we would think there was sin and smoke enough to ward off the curculio. Mr. Roe has a favored location.

President Earle—Has Mr. Stickney tried other remedies than sin and smoke for his curculio?

Mr. Kellogg—I think not, though he is about trying other remedies.

Mr. Plumb, of Wisconsin—I agree in the main with the essayist, but I think he has stated his own experience only. In portions of our State we have not had a respectable apple crop since 1880. While the gouger or curculio is a serious pest, there are other causes of failure. Mr. Stickney manures highly. Currant bushes among his trees grow as high as my head. Perhaps the large mass of currant bushes in his orchard is favorable to the curculio. Climatic conditions are, perhaps, the greatest cause of our failures.

We must adapt our planting to our circumstances. Adaptation is our key-note of success. The Duchess is the type from which we are to expect satisfactory results.

Mr. Patton, of Iowa—I live in Northern Iowa, in the same latitude as Mr. Kellogg. My experience is different from his. Orchards on high lands do well. A neighbor with six acres of orchard on high land makes more money from it than from the rest of his farm of three hundred and seventy acres. We grow the Fameuse, Talman, Willow, Sops of Wine, Red June, and even the Rawles Janet. These varieties will not do on low land. While the Wilson strawberry may do well in Wisconsin, it will not do with us. Green Prolific is more valuable, when fertilized by the Red Jacket. While we of the North may find the Russian apples valuable, we must not put our whole trust in them. They are too low in quality for American tastes.

Mr. Plumb—I predict that our best results from the Russians will be through the infusing of new blood into our seedlings. The Wolf River and Wealthy are seedlings of Russian parentage.

Mr. McClave, of Michigan—The Wild Goose plum has been as great a failure with me as with Mr. Kellogg.

Mr. Johnson, of Illinois—Do I understand that the two gentlemen disagree as to the value of the Duchess?

Mr. Kellogg—Yes, sir. You can prove anything in Wisconsin regarding apples. The Duchess, good in tree, is poor in fruit, as now attacked by the gouger.

Mr. Collins, of New Jersey—The Duchess will not stand our summers.

Mr. Robison, of Kansas—In selecting peaches for cold climates select those with small buds and slender wood. They are much hardier than those of rank growth. The Snyder blackberry will need no winter protection. My Wild Goose plums give me a crop two years out of three. I think there are different varieties sold for the Wild Goose by different nurserymen.

Mr. Beatty, of Kentucky—I raised curculios until I dug up my strawberries in my orchard and turned my hogs loose.

President Earle (presenting some apples which were badly scarred) —These apples have been stung by the curculio.

Mr. Peffer, of Wisconsin—I beg to disagree with the President. I brought those apples from my home. That is the work of the gouger. I have hatched them out and know them to be different. The curculio is larger.

President Earle—The curculio in Southern Illinois does exactly this kind of work.

Mr. Goodman, of Missouri—The gouger is the greatest pest in our State. We shake them the same as the curculio. The Wild Goose will bear immensely if the gouger is kept off. It stings the fruit much oftener than the curculio.

President Earle—Does the gouger transform in the apples?

Mr. Goodman—I think it usually does in the plums.

President Earle—The curculio stings apples and pears, but the eggs seldom hatch; but they injure the fruit by scarring it, as you see these specimens are.

Mr. Kendel, of Ohio—Torches placed in the orchard at night will kill a great many codling moths and curculios.

Mr. Van Deman, of Kansas—It is useless to burn torches for the curculio, as it is diurnal in its habits.

Mr. Hoffman, of Kansas—Dilute coal tar, half pint to the barrel of water, sprayed over the trees after each rain storm will prevent the ravages of the curculio.

Mr. Caywood, of New York—Apples were selling, four weeks ago, in New York, at $1 to $1.50 per barrel. Does it pay to raise apples at such prices?

Mr. Gibb, of Quebec—In Quebec orcharding does not pay on low lands. On the hill slopes it pays better. A neighbor of mine began orcharding about twenty years ago. He has realized about seventy-five per cent on his capital, though his investment has been small. Plums, of the Damson type, are grown to considerable extent with us. They are sent to the Montreal markets by the barrel.

Mr. Sanders, of Indiana—We protect our Wild Goose by letting pigs and chickens have the range of the orchard. With this treatment the curculio only thins out the crop, so that we have good fruit.

President Earle—We think we know the curculio in Southern

Illinois. It leaves its crescent mark on our pears and apples. As this subject has been discussed at considerable length I will now present to you Mr. Cassell, of Mississippi, who will read a paper on

HORTICULTURE IN CIVILIZATION.

BY W. H. CASSELL, OF MISSISSIPPI.

In all ages of the world horticulture has accompanied its civilization, and the attention it has received has been somewhat in proportion to the advance of that civilization; and the original command "to dress and keep the garden" has lost none of its force at the present day, for no country home in civilized lands is complete without its garden. All along the track of ages appear its footprints, blessing generation after generation with its presence. Retaining by tradition the excellence and beauty of the primeval garden, men have ever tried to imitate the original. Some of the brightest intellects and purest tastes have found ample scope for exercise and rich harvests of enjoyment in the pursuit of horticulture. It has also engaged the attention and ministered to the wants of many in the humbler walks of life. The sacred writer in the Pentateuch mentions the Egyptian "garden of herbs by the riverside." The ancient Egyptian tombs are sculptured with beds of flowers, vineyards and fruit trees; the Syrians were noted for the variety of their garden vegetables; Solomon's garden contained roses and lilies, sweet herbs and fruits of various kinds; the King of Babylon constructed hanging gardens to please his Median wife. The Grecian gardens of Hesperides were called by Strabo the "Islands of the Blessed." Among the Romans, Cicero the philosopher and the younger Pliny are said to have devoted much of their time and money to their gardens. The Chinese, from their dense population, have long been fine gardeners, and it is said that for productiveness theirs excel all other gardens. In the eighth century Charlemagne established gardens for improvement in horticulture. With the wane of civilization in the dark ages horticulture suffered in the general decay; but with the revival of the arts, shared in the general improvement, Cardinal D'Este of the sixteenth century being one of its leading patrons.

In the early settlement of this country horticulture was mainly confined to the kitchen garden and the orchard; but with increasing means and greater leisure, flower and landscape gardening received more attention; and led by such men as Downing, Kenrick and others, has added delightful surroundings to many an American home, and blessed our large cities with public parks which are the delight of all classes; so that the history of our world is incomplete without the history of its horticulture. It is, however, in its relation to our American civilization that this Society is mostly interested, and being composed mainly of practical men with utilitarian tendencies, we shall consider our subject in the light of its usefulness; and this restricts us mainly to the vegetable garden and orchard. And we would notice here the magnitude of horticultural operations in this department in

our own country as evidencing the deep interest our people manifest in this direction.

By the last census the total value of orchard products sold or consumed in the United States in 1879 was $50,786,154; of market garden products sold in 1879 was $21,761,250; making a grand total of $72,547,404, to which may be added the garden products consumed at home, which would largely swell these figures. Another fact is noticeable, viz: The rapid increase of the business, especially in some of the Southern and Western States, as shown by comparing the census of 1880 with that of 1870; for instance, my own State, Mississippi, shows in 1870 orchard and garden products amounting to $132,753, and 1880 shows for same $427,215, an increase of over three hundred per cent. in ten years. Florida shows in 1870, $85,713 of orchard and garden products; and in 1880, $912,297, over one thousand per cent. increase. Arkansas in 1870, $212,916, and in 1880, $929,433, over four hundred per cent. Texas, Georgia, and Alabama, also, show a large increase. In the Northern States this increase is not so great in proportion; yet Michigan shows an increase of $403,058; California, $371,718; Illinois, $224,764. Our systems of railroads traversing the country, especially those running in a northerly and southerly direction, are great aids to commercial horticulture, as they furnish rapid transportation for perishable garden products. It is mainly along the line of these railroads that commercial gardening is carried on in the Southern States, and here it is developing with wonderful rapidity; and I doubt not the increase for the past five years in the South is greater than for the ten years just preceding. This rapid increase is significant. It *must be* a profitable business. This development is far beyond the increase in the population of these States, and springs from a recognition of the fact that it pays; for horticulturists of this age are a wide-awake people, quick to perceive and prompt to act in that which yields a good return for labor and capital invested, and while it is profitable to him who has large means at command, it likewise yields a comfortable support to the man in humble circumstances with only a few acres to use. And this is not the least of its blessings. With generous cultivation the value of garden products largely exceeds per acre those of the ordinary farm, and the profits are correspondingly great. It inculcates thoroughness in what we undertake, for one soon learns by experience, that in horticultural operations, half-way work results in failure. There is no school that more strongly enforces the maxim that "whatever is worth doing at all is worth doing well," and the experienced horticulturist from habit is likely to be thorough in whatever he undertakes.

System and order are also taught in this school. One is not long in being impressed with the fact that there is a time for everything, and also a place. There is a time to prepare the soil, to sow the seed, to cultivate the growing crop, and to gather and market it when mature; and he who regards these times will be rewarded with success, while he who neglects these in their proper order, will find also a time to lament his failure. There should be a place for seeds, a place for tools and implements, a place for fertilizers, a

place in which to store and pack the crop as gathered, and so on; and much worry, many extra steps, and great loss of time by having things out of place, soon teach the careless this important lesson. The horticulturist is an industrious man. The very fact that his crops are perishable, must be grown quickly, and quickly disposed of to be profitable, is a great stimulus to activity in their culture and management Hence, the horticulturist is intensely engaged in looking after his own business, and has no leisure to meddle in the affairs of others. His is a peaceable pursuit. Communing with nature through her plants and trees, her fruits and flowers, which never cross nor fret him, and not so often as in many other pursuits brought into contact with the rough angles of human life, he is not so liable to lose his temper, has less occasion for anger and strife, and thus avoiding their unpleasant consequences, he surely, but unconsciously it may be, develops the better instincts, the nobler impulses of his being, until these often culminate in gratitude and reverence to Him who is the Author of nature and the Giver of all good. I doubt very much if in any other class the records of our courts will show so few violators of their country's laws.

Another feature: Horticulture improves the land, and this increases its capacity to support a large population. One of the first things a horticulturist thinks of in attempting to grow his crops is the question of fertilizers; for little if any soil is ever found of sufficient richness to produce crops of the superior excellence he wishes to grow. Therefore, it builds up the country by increasing its fertility. *It is agriculture intensified.* Growing out of this improved condition of soil is still another fact. When a man fertilizes a piece of land he finds that although he has profited by it, he has not wholly exhausted his fertilizer, and he wishes naturally to have the benefit of this balance to use the following season, as so much incidental profit of the previous year; so that if he rented the land the first year he will lease it now for several years, this lease to be terminated in many cases by the purchase of the land, and the man becomes a fixture; in the broadest sense, a citizen.

HORTICULTURE IS PROGRESSIVE.

As in the mechanical department new machinery is constantly being invented, displacing the old by its greater perfection; as new laws are constantly being framed to improve our social condition; as new inventions and discoveries in art and science often astound us by their rapid strides in the march of improvement; as the agriculturist is constantly introducing new varieties of the cereals, new and improved breeds of stock, and so on, shall horticulture, Rip Van Winkle-like, slumber on amid this universal progress, and awake to find itself a decade or century behind the times? The intelligence of this Society supplies the ready answer. Then the horticulturist must become, to a certain extent, an experimenter; I might almost say he is one by necessity. I'll venture there is not a cultivator present, however much caution he may enjoin upon others, but finds himself occasionally

yielding to this necessity. With the astuteness we have mentioned, he frequently observes defects in our present lists of fruits, vegetables and other horticultural productions, and with a laudable ambition and commendable zeal, he applies himself to their improvement, and whoever shall produce a single improved variety is a benefactor to his race. That there will be failures sometimes is to be expected. The records of the past are full of illustrations of this in other departments. Columbus made several unsuccessful efforts before he could obtain the necessary aid to start him on his way to the discovery of another continent, and several failures occurred before "Cyrus laid the cable." But the successes of the past are also encouraging, and many of the excellent fruits of to-day are the result of intelligent effort in this direction. The extent of the effort must be governed by the circumstances and the judgment of him who makes it. It is the part of wisdom to decide all experiments in this way. Whatever is commendable in the individual is commendable also in the masses, and hence every horticultural body, local, state, or national, should aid in this matter, and contribute toward the general good. Realizing this, it may be well for us as a body, now national, to appeal to our general government for aid through experimental stations and otherwise as its wisdom may suggest, for assistance in carrying forward the interests of horticulture now engaging so large a portion of our population. Who will lead in this good cause?

Another suggestion offers here. Some men of ardent temperament are so fond of excitement, so impatient, so anxious to accumulate rapidly, that they are led into various games of chance, trusting to luck, as they call it, for success, and luck often betrays them into ruin. Let such cultivate fruits or vegetables, and in shipping them to market they will soon learn to watch for the account sales from their commission merchants with as much eagerness as they would the toss of a die or a card, and with far greater chances of success, thus affording a safety valve, as it were in that direction, and giving what, for want of a better term, we shall call honesty in chance.

We might also mention other good traits of character fostered or developed by horticulture, such as forecast, carefulness, frugality, etc.; but enough has been said, we trust, to demonstrate that horticulture in this country, by the memories of the great and good who through all ages have been its patrons, by the extent and magnitude of its operations, by its usefulness in that it ministers to the wants of all classes, by the certainty of its compensations for those who engage in it, by the fact that it inculcates system and order, also thoroughness in whatever is undertaken; that it stimulates to industry, develops gratitude and reverence, encourages peaceable living and obedience to law, supplies a safeguard to those who, hasty to be rich, "fall into temptation and a snare;" that it improves the fertility of our soil, increasing its capacity to support future millions in generations yet unborn who are to inhabit it; and that it is progressive in its character, aids greatly in establishing our citizenship on a broader and higher plane.

ORNAMENTAL HORTICULTURE.

As yet we have barely touched horticulture in its ornamental aspect, in floral and landscape gardening. We should certainly pay a passing tribute to those gems of creation which a beneficent Providence has so generously furnished with their brilliant colors in settings of green. Whether seen on the growing plant, gracing the table of the hospitable, worn on the breast of beauty, suspended over the bridal altar, or wreathing the coffin of departed friends, they are the silent interpreters of our feelings and emotions when language perhaps would fail to express them. They are the embodiment of the pure, the lovely and the innocent, and by their association exercise a most wholesome influence, and their culture furnishes profitable employment to many thousands of our people, and it may be well to consider that this Society becomes the exponent of practical horticulture over a widely extended area; and as the lighthouse gives safe guidance to the mariner, showing him how to avoid the breakers and successfully enter the desired port, so will the views advanced, the practices recommended here, become the guide to thousands of enthusiastic but inexperienced horticulturists over this area. Then let us rise to a proper conception of the position we occupy. Let the spirit of harmonious intercourse pervade all our proceedings; let our views not be bounded by narrow prejudices, sectional advantages or private interest, but be broad, generous, continental in their character and usefulness, our statements be based on truth as solid as the foundation of our everlasting hills, and the way to successful horticulture be made so plain that the inexperienced, though of humble mind, may not err therein: let us advocate those principles and exhibit those virtues we have endeavored to describe, and so foster and encourage the useful and beautiful in horticulture, that, added to the solid comforts of the kitchen garden, Pomona's gifts and Flora's beauties shall grace and adorn every homestead in this broad land, and this Society become the leader, as well as the honored exponent of a grand and glorious American civilization.

PLACE OF THE NEXT MEETING—DISCUSSION.

Major Ragan, of Missouri—While I am not sure that this is the proper time to decide upon the place of holding our next meeting, I think we may well discuss the subject while there are yet so many of us present. I would move, therefore, that we now fix the place of the next meeting.

Mr. Caywood, of New York—I would suggest Cincinnati as the place.

Mr. Beatty, of Kentucky—Louisville is central and offers many advantages.

President Earle, of Illinois—We are not now restricted. We can go to Canada, California or Florida and yet feel that we are within the limits of our jurisdiction. I think, however, that while we may appropriately discuss this question, and ascertain the feelings of members, that it would be premature for us at this time to decide.

Mr. Peffer, of Wisconsin—I do not think we could find a better place than Chicago or Milwaukee for our next meeting.

Mr. McClave, of Michigan—I can fully indorse Mr. Peffer's suggestion.

Mr. Babcock, of Arkansas—Either Louisville or Cincinnati would, perhaps, suit more of our members than other points that have been named.

Mr. Hobbs, of Indiana—In view of its excellent railroad and hotel advantages, I do not believe there is a better place than Indianapolis for such a meeting.

Mr. Samuels, of Kentucky—There is no better place than Louisville.

On motion of Mr. Babcock, of Arkansas, the subject was referred to the Executive Committee.

Secretary Ragan, of Indiana—I should like to publish, in our next volume of Transactions, as complete a roster of officers of important horticultural societies as possible. I find this to be an interesting and valuable feature of our published reports. Will members please aid me in securing these lists?

Major Evans, of Missouri—As chairman of your Committee on Excursions, I have arranged with the L. & N. Railroad for members of the Society to go to Pass Christian on Tuesday next. The fare for the round trip will be $1.75, which will include dinner at the Mexican Gulf Hotel.

The Society then adjourned to meet at Horticultual Hall at 10 A. M. to-morrow.

HORTICULTURAL HALL,
FORENOON SESSION, January 20, 1885.

The Society convened in Horticultural Hall at 10 A. M., January 20, President Earle in the chair.

Mr. T. V. Munson, of Texas, was introduced and read his paper on

NATIVE GRAPES OF THE UNITED STATES.

BY T. V. MUNSON, M. SC.

All botanists, who have attempted the classification of the grape genus, have complained of its difficulties, and confusions of one form with another. Many have concluded that its so-called species are only artificial terms to indicate certain forms of considerable extent, but that in reality there is no clear separatrix. This is certainly true in one sense—the order of development in time—as has been proven true of all organic beings, by such vast researches among plants and animals as those of Wallace, Darwin, Hæckel, Walsh and others. According to this, if every individual plant and animal now existing and that has ever existed, were placed side by side according to their affinities and genealogies, the organic kingdom would be one monstrous tree joined in all its parts by the universal cellular protoplasmic link; and this tree would be rooted deep upon another infinite inorganic mass of nicely graded and connected crystalline and chemical atoms, each and every link in the universe of matter, varying but a minute degree from its neighbor, yet two taken at a distance from each other show proportionate differences. If the intermediate individuals were left out of view, those in comparison would be considered of different varieties, species, genera, orders, etc., according to the distances apart the units of comparison were taken. If all still lived and the chain of development seen complete, the fact would not make an ass and a horse, a dog and a wolf, a Caucasian and an African, a Scuppernong and a frost grape any the less different from one another.

The vicissitudes of time have cut and broken away innumerable branches from the great tree of life. They have fallen, through chemical change, back into the mineral base, to be again revitalized, not as the same old individuals, but as parts of those still living and multiplying. Repeated upheavals and subsidence of the earth's crust, through millions of years, as we unmistakably learn in geology, have been the most potent species makers, in a technical sense; and thus the connecting links, especially where large gaps occur between the living branches, are now out of existence and the separation of the living parts as complete and permanent as though they had never been joined, so far as again intermingling is concerned.

But long separation of once joined links, under widely different environ-

ments, has always been the true cause of specific variation. This is done by transplanting to a different soil or climate, or both, and by mixing of blood of two well separated branches (species), giving a more sudden start, to change, than a mere variety, which, if at the same time the new product be put under new environments, as a hybrid grape-seed carried by a bird into an entirely different soil and climate from that occupied by the parents, in time quite a novel and unaccountable species would develop, and only a thorough comparative anatomist could trace its origin.

Some naturalists make the loss of power to intermingle, the separatrix of species. Prof. Planchon, a noted French ampelographer, takes this position. The lamented Dr. George Engelmann, who did so much for useful botany, and in this sphere to simplify the perplexing grape genus, held to this view in the main, and declared it as a law, that, "honest nature abhors hybridization;" as much as to say there is a dishonest nature, or else there are no hybrids.

If this is the proper divider of species, then there is but one species of true grapes, and Dr. Englemann's thirteen native species stand condemned by his own rule, as hybrids are known among all of them. Even the peculiarly distinct and uniform Scuppernong, in the hands of Dr. Peter Wylie, yielded some remarkable hybrids.

On the other hand, Prof. Millardet, another eminent writer on the grape, finds as many true species as Dr. Engelmann, and hybrids among them often. My own experience so abundantly confirms this view, that I am in utter confusion without accepting it. Doubtless the whole disagreement arises from the definition of species, by which the classification is made. A more proper definition of species probably is a type embodying peculiar and uniform general characteristics (however admitting varietal changes), which continually occur by natural distribution over a large area, or in a great number of individuals, and which have great antiquity, and may be supposed to relate purely to a common parent in the remote past. Then those intermediate individuals, occurring here and there in the vicinity of two species in juxtaposition, which nearly always possess only the two sets of specific characteristics juxtaposed in the two species, but completely blended in the lone individual, such as we find in the mule and mulatto, we are justified in terming hybrids.

One holding the theory that "nature abhors hybridization," is always perplexed at finding such individuals wild, and must invent still another theory, that it is "a sport of nature," in other words, an effect without a cause; or else be continually creating new species, as did Rafinesque, in either case producing endless confusion.

In a long course of reproduction, hybrids, like varieties, may become species. This seems true of several of our recognized species of grapes—the Palmata in particular, and Monticola. The "Southern Æstivalis" of vineyardists is entirely too young and variable to rank as a species, yet if placed in a region apart from others for a long period it would become a species of this character. More of this further on.

The most natural method of classification would be to follow the development in time, if possible. This would lead to the necessity of being a good paleontologist and geologist, as well as an expert botanist. In its full amplification it would add another most useful study to the university course, viz.: the origin, development, perpetuation, hybridizat on and decay of species; or, to coin a word for brevity's sake, *Speciology.*

Looking at the classification of grapes in this light, Dr. Engelmann's order (the ablest and most accurate yet published, but which seems to have been made entirely according to botanical analysis of specimens in the laboratory, and without considering geographical distribution and development in locality and time,) appears to me quite unnatural.

Claiming and possessing no authority, only of fact, as acquired by careful search and observation, to vary from so profound a student of nature as was Dr. Engelmann, and knowing well how I expose myself to scathing criticism and the charge of pedantry in suggesting a different order, I do so because I believe it to be the most natural and useful to the viticulturist. Further investigation may modify it. The tendency is simplification.

Rafinesque's forty-one American species of fifty-five years ago, by Engelmann were reduced to thirteen, well defined and in the following order: 1. Labrusca; 2. Candicans; 3. Caribbea; 4. Californica; 5. Monticola; 6. Arizonica; 7. Æstivalis; 8. Cinerea; 9. Cordifolia; 10. Palmata; 11. Riparia; 12. Rupestris; 13. Vinifera (placed here by Engelmann to show his notion of its relationship); 14. Rotundifolia, or Vulpina.

My reasons for dissenting from this order and suggesting another, are: 1st. The natural line of introduction and development (suggested by the distribution conjointly with the structural analysis of the species, and which pretty nearly agrees with the more recent geological changes in North America) upon this continent is violated in several places. 2d. This leads to one of the most vital of all subjects to the practical horticulturist, viz.: adaptability to special localities and soils.

To amplify my first reason: The geology of North America indicates clearly that Canada was first permanently above the great universal ocean. Next a backbone shot up along the Apalachian region, gradually growing less, and curving in Eastern Kentucky and Tennessee to the westward, passing in a low range into the Ozarks of Southern Illinois and Missouri, Northern Arkansas; thence southwestwardly through the Indian Territory, Western Texas, and joining in more recent geological time the Rocky Mountain uplift; thus forming the great Mississippi basin-rim on the east, south and west. Within this rim, occupying the entire basin, there once was an inland sea, higher than the outer seas, which, finally cutting out on the east, formed the St. Lawrence river, and on the south made the "Father of Waters," passing through the rim not far above Cairo, Illinois. By the rains of time this inland sea became fresh water lakes, of which we have yet a few remnants in Minnesota, Wisconsin, Michigan and Canada.

On the rim of this basin the first lodgement of grapes was made, probably

far up in Canada, and came in from the Atlantic on the east, up the then broad, long gulf now contracted into the St. Lawrence, and having no mountains to climb, spread from there westward and southward, stocking the entire basin with the Riparia blood, which since has run into various tribes; Riparia, the main stem, all northward from the Ozarks; in these, the Rupestris, and westward Nuevo Mexicana and Arizonica. Later, the southern rim caught new importations from the warmer southern seas, in the direction of the Caribbees, landing the Cordifolia, Æstivalis and Cinerea, from Virginia to Texas, which, in time, spread into New York, Ohio, Illinois and Northern Missouri, and southward, more recently, to the Gulf.

As time went on, and the constantly diminishing Gulf continued to add the hundreds of miles of illimitable natural wealth—now the Southern States—to the south side of the Ozark rim, she forgot not to waft still other grapes (which had already specifically developed), to these shores from the center of origin, the Caribbee Islands, or, much more probably, from a continent eastward of the Caribbees in the Atlantic Ocean, dropping the Muscadine or Scuppernong of the South, all along the coast from Mexico to Maryland, the Labrusca on the eastern coast from Maine to Georgia, the Mustang (Candicans) on the coast of Mexico and Texas, then far inland, and Caribbea, quite recently in Florida.

Geology, palæontology, archæology, the natural distribution of plants and animals, and the results of recent deep-sea dredgings, all clearly point to such a continent in the misty past, and this reminds us of the legendary "Atlantis" of Plato, as still existing there some twelve thousand years ago, and which in one awful day and night of earthquake convulsion, sank deep beneath old Ocean. (See Donnelly's "Atlantis," Harper Bros., 1882.) Be that as it may, the species of grapes in the United States came in succession, first in the North, showing their time of residence by the extent of their spread, while the later came in the South and around the coast, having less distribution.

Now you can comprehend why I propose a different order among the species from that of Dr. Engelmann, and can easily see the importance of my second reason, *adaptability;* hence I offer the following:

Classification of the Native Grapes of the United States, According to their Natural Affinities and Distribution (including Vinifera for comparison).

1. RIPARIAN GROUP.

Earliest to leave out, bloom and ripen. Have very thin diaphragms in the joints. Grow with ease from cuttings. Roots wiry, penetrating and perfectly resistant. Plant endures all manner of hardships well. Cluster and berry small to medium. Fruit in quality good to excellent, possessing rare wine properties.

(*a*) *Riparia* (Riverside Grape).

Extends from Labrador to Texas, from Virginia to Montana. Leaves with coarse, long, sharp teeth, smooth or slightly pubescent; wood gray,

smooth; often pubescent on Mississippi River; tendrils rather weak; diaphragm thinnest of any species, being not much thicker than writing paper; accidentally hybridized with Labrusca in Kentucky gave the Taylor. No vines of pure blood are yet cultivated for profit.

(*b*) *Rupestris* (Sand-beach, or Sugar Grape).
From East Tennessee westward, in the hilly regions, to Southwest Texas, fast disappearing by the browsing of stock. Leaves reniform, smooth, coarsely toothed; wood dark gray, smooth, slender, much branched and spreading gooseberry-bush fashion naturally, but if trained makes a good vine, but requires much pruning; tendrils very small and weak, soon disappearing after first year. Mr. H. Jaeger is the only one who has introduced any varieties into cultivation. His Nos. 59, 60, 62, 64, etc., found wild, make a fine claret, and offer a fine start to hybridize upon, which he has successfully done already with promising results. Huntingdon is an accidental hybrid, containing a large portion of Rupestris blood and some Riparia. The earliest of all species to ripen; fruit usually larger than Riparia, but cluster smaller; fruit perfectly resistant to rot, and may give a valuable strain of varieties, free from this more threatening trouble than phylloxera, to the Vinifera and most Labrusca and many Æstivalis.

(*c*) *Nuevo Mexicana* (Prof. Lemmon) (Woolly Riparia).
Northwestern Texas ("The Panhandle") and New Mexico, in sandy ravines and canyons. Leaves cordate or nearly round, with coarse, sharp, or blunt teeth, more or less woolly, especially when young, leathery and enduring; wood light gray, and quite woolly when young; erect, shrub-like, with wiry, deeply penetrating roots in the fashion of a tree with taproot; grows naturally in thickets, like bushes without support, having small tendrils, but when brought into lower timber lands makes strong climbing vines; fruit and seed larger than the Northern Riparia; quality most excellent, very sugary; offers most excellent stock for the experimenter. The writer has varieties with fruit one-third of an inch in diameter. This form gradually runs into the next, which has a great similarity in habit of growth, with larger fruit-clusters. It is termed

(*d*) *Arizonica* (Arizona Grape).
Leaves round cordate, coarsely and regularly acute toothed, smooth or pubescent, seeds much like the woolly form, wood gray, or reddish gray, smooth, or pubescent when young. Fruit excellent.

2. Cordifolian Group.
Late to leave out, bloom and ripen; wood and leaves smooth, diaphragm thick; fruit in long, many-berried clusters, very small, mostly seed and skin; roots wiry and resistant; found mostly in bottoms.

(*a*) *Cordifolia* (Frost Grape; Sour, or Pungent Winter Grape).
Extends from New York west to Nebraska and Kansas, and covers the regions southward from these States to the Gulf, chiefly in rich bottoms and along streams. Leaves heart-shaped, with coarse, blunt or sharp teeth, smooth on both sides, leathery, veins below of a yellowish green; young wood smooth, dark gray or mottled dark and light gray, tendrils long and very strong, climbs high and grows to great size, sometimes a foot or more in diameter; diaphragm very thick; cuttings grow with great difficulty; fruit small, shining, seedy, very sour and pungent till ripened with frost, then sugary. A most remarkable hybrid of this with Labrusca was found wild in Virginia by a Mr. Ronk, some thirty years ago, having fruit and cluster about the size of Ives's Seedling, of a pure rich vinous quality, pulpless, with a jelly-like, melting meat. Vine very productive, vigorous. It was moved into the man's yard, and has borne well for twenty-eight years, and is yet in fine health and growth. Has never been disseminated. Was accidentally brought to my notice while searching for specimens of native grapes. Have carefully examined the leaf, vine, and ripe fruit, which show it to be such a hybrid. Have also found some quite good varieties of this species hybridized with the large Æstivalis in Texas. These hybrids show the ameliorating effect of hybridization. Scarcely could any two species of less promise for intermingling than Cordifolia and Labrusca, be named, yet Ronk's Blue of Virginia is certainly fine, with neither pungency nor foxiness.

(*b*) *Palmata*, or *Rubra*.
Along the banks of the Mississippi river, above St. Louis, Mo. Seemingly a multiplied hybrid of Cordifolia with Riparia, with possibly a trace of Cissus blood, indicated in the fruit, seed and leaf. Leaves sharp-toothed with long taper-points, not always palmate, young wood always red, hence Rubra, a better name than Palmata; grows fairly well from cuttings; diaphragm medium; leaves and wood smooth, branches slender. Rarest and most local of all our species.

3. Cinerean Group.
Leaves out, blooms and ripens after Cordifolia, young wood angled and covered with an ash-colored cobwebby pubescence; cuttings root with much difficulty.

(*a*) *Cinerea* (Ashy or Sweet Winter Grape).
Covers nearly same region, and found in similar localities with Cordifolia, but more inclined to warm wooded bottoms, and does not extend so far north, west of the Alleghanies, but is reported to me by Mr. A. J. Caywood, in S. E. New York, above where Cordifolia has been reported; more sensitive to severe changes than Cordifolia, when taken into open culture. Having the same habits, distribution, size and shape of cluster and fruit, and blooming and ripening late (later

than Cordifolia), and often hybridized with it. I have placed Cinerea next Cordifolia, though otherwise it is a very distinct species. It extends from Western Texas to the Atlantic, from Illinois and New York to the Gulf, even to Southern Florida, and in its pure form is quite constant; leaves, from Manatee county, Fla., S. E. Arkansas, and Red River, Texas, showing great similarity in having a long, taper point, small, blunt teeth, under surface densely pubescent, of an ashy brown color, and upper surface with scattering, cobwebby hairs drawn along the surface. Young wood distinctly angled (more in western, less in eastern samples), and, like the leaves, has the ashy pubescence; young wood under the pubescence brownish gray; tendrils long and strong; clusters usually exceed Cordifolia in being longer and much more branched; fruit very sprightly, pure, rich, must on Æchsle's scale, from 100° to 120°, vinous, no trace of pungency or disagreeable property; diaphragm thick to very thick; roots wiry, penetrating and resistant; endures great heat and drought, but sensitive to cold.

(*b*) *Monticola* (Mountain Grape).

Hills of Central Western Texas, apparently an old, much multiplied hybrid of Cinerea with some round, smooth-leaved Riparia variety; leaves round, smooth, or with scattering, short pubescence; under surface of a shining appearance, small, leathery, well suited to enduring heat and drought, leaves out, blooms and ripens very late, about with Cinerea, and the cluster much resembles it, though smaller, and the berries larger. Varieties have been reported with white fruit and of fair size and excellent quality. Young wood angled and pubescent, but not so much so as Cinerea. Tendrils medium.

4. ÆSTIVALIAN GROUP (Summer Grapes).

Leaves out, blooms and ripens before Cordifolia, here in North Texas, but in S. W. Missouri Mr. Jaeger reports it later in blooming, and after Labrusca. With further investigation I find that the Cordifolia species blooms before Æstivalis here in Texas, as well as elsewhere, from three to five days, also, that Warren, Herbemont, Le Noir and others of that strain, show faint traces of Vinifera, though chiefly Æstivalis and Cinera. Diaphragms thick, young wood dark, reddish brown, often with weak prickles, and prunose bloom, especially near the joints on vigorous growth, which are easily rubbed away; roots hard, penetrating, resistant; cuttings root poorly; tendrils medium to very strong.

(*a*) *Northern Form.*

New York, Ohio, Indiana, Illinois to Missouri river, southward to Maryland and Tennessee. Leaves thin, with a thin, light colored pubescence along veins on under side, seldom lobed more than Labrusca, fruit usually small and astringent, especially east, but larger and finer going westward. A fine variety found by A. J. Caywood, in New York, hybridized with Catawba (Labrusca) by him, gave that re-

markable new grape, Ulster Prolific, much larger and finer than Delaware. This form insensibly runs into the

(*b*) *South-eastern*, or *Norton's Va. Forms.*

Found southward from the Northern form, and east of the Mississippi river. Leaves more leathery, with dense brown pubescence along the veins, and occasionally spreading therefrom upon the under surface of the leaf, especially in Florida samples, where also the young twigs are covered with this rufous pubescence; fruit usually quite small, not much larger than Cordifolia, and very astringent, in medium to long and slender clusters, but occasionally quite fine in size and quality. This variableness, doubtless, has come by the intermingling, from time to time, with other species, especially with Labrusca, and occasionally with Cordifolia and Cinerea. When with the latter, as in Warren, Herbemont, Le Noir, Louisiana, etc., the result is marvelous.

(*c*) *Southwestern Form, Post Oak*, or *Lincecumii*, in Texas; *Æstivalis Jaeger*, in Missouri.

From Missouri river through Western Missouri, Arkansas, Indian Territory, Northern and Eastern Texas, and Northeastern Louisiana. Leaves largest of any species, often beautifully, three, five and rarely seven-lobed, having a peculiarly bluish appearance beneath, with veins bearing a light brown pubescence. The fine prickles and prunose bloom on young wood quite characteristic, more so than the forms (*a*) and (*b*). Fruit small to very large, in color black and shining, but generally with heavy bloom, through shades of purple and red to nearly white; quality from austere, acid and disagreeably astringent pulpy and musky, up to pure, delicate, vinous, sweet, with sometimes delightful nutty and vanilla-like flavors, offering a fascinating field for the experimenter. Mr. Hermann Jaeger has done good service in his region by finding such treasures as Racine, Neosho, 4, 13, 17, 32, 42, 43, 52, 55, and numerous others, and by producing hybrids already with Rupestris, in 70 and 72, and Cinerea in his 50 and 56. Here in Texas "Lucky" (probably the earliest Æstivalis known), "Purple," "One Seed," "Late Prize," and a number of others have blessed my own searchings in the woods.

Often this form shows traces of Candicans and Labrusca in the fruit and seeds, and some other points. In Texas, where the Candicans is so abundant, it is easy to see how this blood got into Æstvalis; in Southwestern Missouri it is not so easy to account for, and the Labrusca blood, which seems still more frequently met with, is inexplicable, unless it was brought among them from the East by pre-historic man, or already intermingled, when drifted upon these shores by the ocean currents, from the original home of the grape genus, where these forms or their progenitors grew near each other. It is

only conjecture now, but botanical analysis, nevertheless, reveals these characteristics in many of our western Æstivalis.

5. VULPINA GROUP (Foxy-leaved Grapes).

Dense pubescence or wool on under side of leaf, in the Labrusca and Caribbea, often of a foxy color, and this is probably why, originally, Linnæus applied Vulpina to the species, and by some mistake it was later unaccountably and improperly applied to Rotundifolia or the Scuppernong. To call the musky flavor of Labrusca "foxy" is a misnomer, as no fox smells or tastes like that; but the under side of many Labrusca and Caribbea leaves have a true foxy appearance, while no other species has. Fruit usually large, with tough, thick, pungent skin, especially so in Candicans, pulpy, and in Labrusca having a most characteristic musky smell and taste. Leaves out, blooms and ripens after Riparia and before Æstivalis. No one of this group extends naturally into the inland basin.

(*a*) *Labrusca* (Fox Grape).

Atlantic slope, from Maine to Georgia. Concord, of Massachusetts, Catawba, Isabella, etc., of Carolina, are fair types. Loves warm, wooded, well drained, sandy lands, much of the habit of the Æstivalis; roots spreading, of medium firmness, only fairly resistant; wood firm, smooth or woolly pubescent when young, of a brownish red when mature; diaphragm medium to thick; cuttings grow readily; leaves large, entire or three-lobed, woolly pubescent beneath, often of a foxy-red color, leathery; tendrils medium to strong, *continuous* in well grown wood, though in Catawba and some others often *intermittent* like other species, indicating intermixture; fruit large to very large, in medium to large clusters; seeds large, notched at top, with sunken raphe, and chalaza. The chief species upon which experimenters in the United States have worked, producing innumerable varieties and hybrids, the latter almost entirely with Vinifera, and generally partaking with them in their tendencies to rot, mildew, and sensitiveness to extremes and philloxera.

(*b*) *Caribbea* (*Caloosa*, by some, in Florida).

Middle and South Florida, and almost identical with same named species in Cuba, Hayti, Porto Rico and Jamaica. In Florida quite variable, from much like Labrusca to close resemblance to Candicans; roots wiry; wood more or less woolly, brownish red; diaphragm medium; cuttings root poorly; leaves intermediate in shape between Labrusca and Candicans, deltoid, smaller than either; pubescent, similar to Labrusca, but rather more woolly; tendrils medium; fruit small to medium, generally austere, pulpy. The species often occurs mixed with Æstivalis, which is abundant in same region. Though evidently of later introduction than Labrusca or Candicans, I place it here, as its botanical analysis clearly requires.

(*c*) *Candicans*, or *Mustangensis* (Mustang).

Southeastern Indian Territory, in a belt from one hundred to two hundred miles wide, extending southwestwardly into Mexico. Found chiefly in strong, well drained limestone bottom and bluff lands, climbing by medium tendrils profusely to the tops of tallest trees. Have found vines with as many as four *continuous* tendrils. Roots deep and wiry; wood rather soft, but hard to root from cuttings; diaphragm medium; bark on old wood very finely divided and checked by thread-like fibers, persistent, becoming very thick; young wood heavily coated with a cobwebby white wool, beneath which the cuticle is of a light gray; leaves usually deltoid on old vines, being nearly truncate at base, and obtuse pointed with few small mucronate teeth, convex on upper surface, while all other species are concave, or at most flat, as in Caribbea, densely woolly below, like the young wood, and thin, cobwebby hair on upper surface when young, becoming smooth and leathery with age. On young vines leaves often deeply, almost palmately-lobed, as are the Æstivalis, and this fact points to a former near kinship of the two species. Fruit large to very large, in small clusters; very prolific; blooms but a few days later than Riparia, and numerous hybrids therewith occur, as also in Western Texas with Rupestris, "Vitis Champini" being one such. Seeds intermediate in markings between Woolly Riparia and Æstivalis, and also bear some resemblance to those of Rotundifolia, in sometimes having small wrinkles radiating from around the chalaza. The fruit, cluster and habit of vine also bear some resemblance to Rotundifolia, but otherwise it is exceedingly different; skin thick and possessed of fiery pungency, but the pulpy inside sweet and juicy, with generally a pleasant taste, but none of the Labrusca flavor whatever; makes a durable, rich wine of excellent taste.

6. MEATY-FRUITED, SOFT-ROOTED GROUP.

Chiefly found around the Mediterranean Sea and eastward in Asia, running through Persia, India, Burmah, Siam, China and to Japan, originally in several species. The only native in the United States of this type seems to have come from across the Pacific and spread up and down in California.

(*a*) *Californica.*

In habits, roots, wood, leaves, tendrils, fruit, seeds, cluster, time of blooming, ripening (which is about with Æstivalis), and the readiness with which it intermingles with Vinifera growing near it, it is certainly more nearly related to Vinifera than any other American species. Though more resistant than Vinifera, yet it is less than any other native. In leaf it reminds one of the Grenache and Burgundy grapes.

(*b*) *Vinifera* (Old World Grapes).

Seems an artificial combination of several original species from Europe

and Asia and Africa, by long hybridization and cultivation. Placed here only for comparison and to indicate its relationship. This appears to occupy about the same position in distribution in the Old World as do the Riparian tribes in the New, and seem to have drifted eastward from the center of origin, as did the Riparia westward and northward.

7. ROTUNDIFOLIA (*Vulpina*, improperly Scuppernong or Muscadine). From Grayson county, Texas, eastward in bottom wooded lands to Southern Maryland, and southward in all the Southern States to the Gulf; roots very hard and penetrating; wood hard, slender; grows with greatest difficulty from cuttings; warty, with most obscure grooves in young bark of any species; no proper pith, and, consequently, no diaphragm; leaves round or heart-shaped, with coarse, regular, acute teeth, smooth and shining on both sides, firm and tough; tendrils never forked, as is the case in all others; medium; fruit very large with a rough, tough skin, always of an agreeable taste, making good wine; seeds very large, somewhat resembling small coffee grains, small wrinkles radiating from the chalaza toward the margins, but not around them; clusters very small, having from three to eight berries, which drop easily as soon as ripe; seems to have no diseases and never fails to make a crop in its native home; leaves out and blooms the latest of all, but ripens from August to October. By distribution it would come before Californica and Caribbea in the United States, but by affinity and development it is most distinct from all other species and has never been found hybridized in the wild state with any other.

With this outline and classification before us we can the more readily and intelligently enter into some viticultural observations, which I trust may lead to more extensive and accurate experiments in the endeavors to develop the valuable qualities so numerous and superior in several of our native grapes.

To further illustrate natural distribution, whose laws we must observe to be successful, I shall only cite the single State of Texas, which stands foremost of all in the number and value of species, illustrating most admirably the rules of adaptation. In her northwestern "Panhandle" are Riparia, proper, though not abundant, and Woolly Riparia (Nuevo Mexicana); in her central belt of intermingled prairie and timber, hills and plains, silicious and calcareous soils, of the cretacious formations, are scatteringly, Smooth Riparia, Woolly Riparia, Rupestris, Monticola, Cinerea, Candicans, Cordifolia and Æstivalis; extending on to the moist, sandy, timbered regions, along streams and timber belts, in her black prairie region, are Candicans abundantly in wooded lime soils, Cordifolia and Cinerea in bottoms, Æstivalis in sandy post-oak lands; in the eastern sandy, densely timbered regions, continue scatteringly Cordifolia abundantly, Æstivalis, Cinerea and often Rotundifolia, the latter becoming very aboundant lower down, while Cordifolia and Æstivalis are seldom found, and Cinerea is still common to the everglades bordering the Gulf.

This teaches the northern vineyardist that he need not try the Scupper nong, the Mustang, the Caribbea, nor the Cinerea and Æstivalis from the far South, especially of the low, warm wooded regions. Even Labrusca is not the most proper species for the inland hardships, though great blessings have followed the efforts of Bull, Rogers, Moore, Miller, Campbell and many others. From the exposed fields of the large-fruited Æstivalis and "steel-clad" Rupestris, and Riparia of the West and Southwest, where parching drought, balmy zephyrs, play summer one day, and rattling hail and sleet, and bare-faced, whistling "Northers" play winter the next, can the experimenter draw with immeasurable prospects of great success in this region. On the other hand, the South can feel encouraged most royally in her large, luscious Scuppernongs, Æstivalis, and the wonderfully prolific, long-clustered, tightly clinging exquisite Cinerea See what has resulted from accidental wild mixing of Cinerea and Æstivalis, in Georgia and elsewhere! Warren, Herbemont, Le Noir, Pauline, Louisiana, Harwood, and still brighter gems yet to hear from, have come to bless millions of homes with a sprightlier fruit than was ever known among the Vinifera developments of thousands of years.

The discovery of the truth that the Warren, Herbemont, etc., are the result of such a mixture, is of inconceivable value to the American vine-grower.

I humbly claim the honor of the solution and demonstration of this knotty question of the scientific viticulturist before you here to-day. I am happy to have the privilege, by the kind invitation of your President, to declare this discovery before the largest horticultural society in the world—The American Horticultural—under the span of the greatest horticultural hall, and within the grounds of the greatest exposition the world ever saw, and to demonstrate it, in part, by growing plants in pots, mounted leaves, seeds and wood, before you here. After years of diligent search, enquiry, collecting samples, and the growing of thousands of seedlings of Herbemont, aided by comparative anatomy, and having samples of other such hybrids, known as such, produced by Hermann Jaeger, and a number found wild by me, I feel satisfied I have demonstrated what Prof. Millardet has recently surmised by botanical analysis.

In connection with these investigations many other similar but less difficult problems have been solved. The Delaware proves to be a hybrid of Labrusca and Æstivalis, having no Vinifera blood, as generally supposed. Cynthiana proves to be only a synonym for Norton's Virginia, and not a native variety from Arkansas. Warren proves to be a distinct variety from Herbemont and not a synonym. The original vine stands in Warren county, Georgia, hale and healthy, over thirty-three inches in circumference at base. There are numerous seedlings of Warren in various parts of the South, varying slightly from it. Of these Herbemont appears to be one.

Now I feel we need no longer invite rot, mildew and phylloxera, by hybridizing with Vinifera, seeking fine quality when we have such examples of pure American blood with freedom from disease, as are Delaware, Ulster

Prolific, Warren and its numerous progeny, Elvira, and its bright young family, Jaeger's No. 70, and such pure bloods as Norton, Perkins, Lady, Amber Scuppernong, Jaeger's many Æstivalis and Rupestris and some remarkable Texan varieties. We have everything to encourage us, except we need more Caywoods, Marvins, Campbells, Rommels, Onderdonks and Jaegers.

There are no less than ten species of grapes in the United States possessing great capabilities in the hands of skillful experimenters. From one or two species of apple, naturally small, astringent, and unfit for food, have come vast developments, till now the entire year is supplied with the most appetizing and healthful of fruits; yet room still remains for further improvement. Then what latitude may we lend our fancies in the contemplation of this decemvirate of Vitis (life-giving) vines, which stretch forth their affectionate tendrils, as though they would bind up and beautify, with luscious purple, pink and white festoons, every home in our broad land! It is a rising family; it is a loving genus; a few of its members have been the staying companions of man through all historic ages, and here, at our very doors, climbing the trees in our pastures, are added half a score more still brighter gems, with unnumbered varieties of each, to engage our acutest intellect, and exercise our most cunning skill, ready for infinite molding as we will.*

CHARLES DOWNING'S DEATH ANNOUNCED.

At the close of Mr. Munson's paper, Mr. Williams, of New Jersey, read from a morning paper a telegram announcing the death of Charles Downing, and moved the appointment of a committee to draft resolutions.

President Earle appointed on said committee, Mr. Williams, of New Jersey; Mr. Smith, of New York; Mr. Munson, of Texas, and Mr. Lyon, of Michigan.

The President also appointed the following a committee on Horticultural Hall: Mr. Gould, of Wisconsin; Mr. Lyon, of Michigan; Mr. Klee, of California; Mr. Gibb, of Quebec, and Mr. Roe, of Wisconsin.

DISCUSSION ON MR. MUNSON'S PAPER.

Mr. Williams, of New Jersey—Mr. Munson has placed this Society under great obligations for his able paper. I move a vote of thanks to him for his exhaustive labors in systematizing our American grapes.

The motion was seconded and unanimously carried.

*The first premium was awarded Mr. Munson's collection of "Native Grapes of the United States" in the World's Exposition, at New Orleans, a compliment most worthily bestowed.—SECRETARY.

Mr. Munson, of Texas—My collection of grape leaves will remain here until the close of the Exposition. They will then go to some scientific institution.

Mr. Wright, of Iowa—I have never heard a more valuable scientific paper read. Mr. Munson has had the nerve to make his paper practical as well as scientific. I congratulate Mr. Munson as the author of such a paper, and the Society as its recipient.

Mr. Lyon, of Michigan—This paper seems to be a subject of thought rather than of discussion.

Secretary Ragan, of Indiana—This paper alone, as part of our published proceedings, will be worth far more to any horticulturist than the annual membership fee in our Society.

On motion the Society adjourned to meet at 8 P. M. at President Earle's residence.

PRESIDENT EARLE'S RESIDENCE,
EVENING SESSION, Jan. 20, 1885.

President Earle—We are fortunate in having with us Professor Lemmon, of California, who is an original discoverer in botany, and whose special topic this evening is wild potatoes. As you will see from the samples, though the potatoes are small, he grows a great many in a hill. Ladies and gentlemen, I have great pleasure in introducing Professor Lemmon.

INDIGENOUS POTATOES OF NORTH AMERICA.

BY PROF. J. G. LEMMON, OF CALIFORNIA.

Mr. President, Ladies and Gentlemen of the American Horticultural Society:

I offer no apology for desiring to present to this learned Association a short paper upon the Indigenous Potatoes of North America.

The frequent falling away of old, standard fruits, grains and vegetables, right and left, the gradual subsidence from prominence of certain favorite varieties, warns the prudent mind to be on the alert for impending disaster, and to avert it *in toto*, or quickly apply equivalent relief.

The common potato has been nearly blotted out of existence from our fields and gardens once, and under present modes of treatment, it is believed, and with present stock of varieties, it may at any time be utterly destroyed.

It is but common prudence when a storm threatens, to be ready to cast an anchor to windward with the first sight of the wreck-making breakers.

Desiring to cover new ground only, at this time, I refer the interested to former papers on file in the records of the California Academy of Sciences in San Francisco, and to other papers and reports published from time to time in California, and other journals during the last two years. In those papers much that we have gleaned of the early history, migrations, cultivation, and obstacles to the introduction of this so-called "new root from America" was compiled. It was shown that this most important esculent, though discovered and carried into Europe 322 years ago (1563), yet was proudly ignored by the nobility as too vulgar for their appetites, kicked and cuffed about by the common people as too earthy for their food, lampooned by the scribblers as a worthless American fraud, interdicted by municipal authorities as injurious, cursed by the clergy as poisonous, only tardily and stealthily planted by a few determined spirits from fresh importations during over 230 years, not coming into general use until the beginning of the present century—only eighty-five years ago!

The importance of the potato is therein stated as America's best gift to mankind, being next in rank to wheat among food plants of the whole world, corn being third, while potatoes exceed both in productiveness, the yield per acre, in weight, being thirty times greater than wheat and twelve times greater than corn.

Its pliability, its development under cultivation, has been discussed as exceeding that of any known esculent; one variety or another flourishing under wide extremes of latitude and diverse degrees of altitude—growing, in fact, wherever man can live.

Its suspicious fellowship in the mostly poisonous family of Solanaceous plants has been presented, and the conditions given where, by exposure of the tubers to sunlight or hot winds, the potato is extremely injurious, indeed even deadly poisonous; but other well-known edible plants of this same order are enumerated, notably the tomato, the egg-plant, the physalis, or ground cherry, and others. In this connection, the tobacco plant may be alluded to as a rank poison, for which man has acquired a most singular and disagreeable habit.

The various qualities and uses of the potato as ordinary food, prepared in several ways, its service as an antiscorbutic in hospitals, prisons and on shipboard, its large stores of starch which are readily converted into sugar, its dextrine, its intoxicating product under distillation, etc., etc., have been shown and their relative importance illustrated.

Its value as pre-eminently the poor man's bread is abundantly proved, for it gives fair crops on poor lands, or on the most limited areas. On several occasions the potato has averted famine over wide regions of the earth. In this connection it is seen that certain districts have been enabled to sustain twice the population they otherwise could, and hence over-crowding, and consequent suffering, degradation or forced emigration have been prevented.

The original habitat of the potato has been discovered as being in two regions equi-distant from the equator, north and south, and deductions presented implying that the northern species of Arizona and New Mexico should be expected to give us of the Northern Hemisphere a better, stronger tuber, than the long-cultivated foreigner from the low sea coast of Chili.

The true nature of the potato is described as being in no sense a root, but a tuber, the condensed terminal portion of a branch or subterranean stem, and that the yearly planting of these tubers but continues the perennial life of a plant that first germinated perhaps ages ago.

The phenomenon of bud-variation is closely connected with the foregoing statement, for many of our common varieties are but sports of peculiar cultivation, liable at any time to revert to former conditions. Variation from the seed is known to be more nearly permanent.

The mischievous practice of cutting the tubers for seed-planting is vehemently condemned as tending to the ultimate degeneration of the plant, and inferences drawn that, though the potato continues to give fair crops after such treatment, it only proves what great natural vigor and power of resistance this wonderful plant possesses, and what Christian forbearance it displays when thus vilely assassinated decade after decade.

Its enemies of the insect world are discussed, and the opinion of learned entomologists given that the chief enemy, the Colorado beetle (*Doryphora decem-lineata*), was developed from a harmless insect. He came into prominence when the cultivation of the potato was extended westward into the Rocky Mountains, where, perhaps, for ages this now terrible little striped bug, acting upon the divinely ordained system of checks and balances in nature, had been quietly and contentedly feeding upon indigenous species of the Solanum family. The new and very nearly similar plants of the potato being furnished in great abundance, in fact intruded upon its pasture grounds, the insect was forced to feed upon them, acquired an appetite for them, multiplied prodigiously in proper ratio to food supply, and became a forced emigrant, journeying eastward, following along the potato fields almost unperceived until he reached the Mississippi valley in 1859, thence swarming over to New York and New England, and finally half frightening Europe out of her senses.

Its diseases have been descanted upon, particularly the great potato blight of 1845, and the four following years; a disaster that in Europe doomed to lingering death by starvation multitudes of people, especially in Ireland; relieved at last by a distribution of wheat and corn at an expense to the British government of £10,000,000 sterling, and of a like large sum from America.

The causes of this great and sudden decay of the potato crop are inquired into and its importance and the difficulty of solution comprehended by the statement that the potato rot has proven the greatest enigma of the 19th century, and that it has given origin to the largest amount of literature the world contains written upon a single topic.

In 1873 the Earl of Cathcart, England, offered a prize of £100 for the best

essay upon the cause and prevention of potato blight—a prize for which ninety-four eminent scientists contended, but which the committee of awards, appointed by the Royal Society, declared could not be claimed by any of the essayists, though most of them agreed upon the *degeneration of the tuber* as the great underlying condition for the fungoid attack of the plague (*Peronospora infestans*), produced by long-continued, improper, unnatural so-called cultivation of the potato by dissection, and by highly stimulating manures.

Aside from these startling or otherwise interesting facts and these precautionary hints, it may be of great financial or economical importance to have new (provided they are better) varieties of potatoes introduced to popular favor at any time. This we propose to do by going at once to original species, as the Rev. Chauncey E. Goodrich did after the great blight in 1850, by which he renewed the culture of potatoes, or rather substituted new ones for them, and gave us all we have of potato strains to-day.

But we shall not select for parent stocks the Aquinas, from the coast of Chili, nor yet the Noaglias, from near the summits of the Peruvian Andes; but we choose the apparently fully as promising species growing almost at our doors in the mountains and high plateaus of the Southwest.

Without repeating any part of the account of how these potatoes were rediscovered by us, two years ago, we will proceed at once to a description and examination of the two species. They are known to scientists as *Solanum tuberosum*, Linn., var. *boreale*, Gray, and *Solanum Jamesii*, Torr. The first species was discovered many years ago, on the Rio Grande, near El Paso, by a botanist named August Fendler, and was named then by Dr. Gray *S. Fendleri*. Afterwards better specimens convinced the doctor that the plant was but a northern type of the original *S. tuberosum*, of South America, and so he named it as above, variety *boreale*. It slightly resembles some varieties under cultivation, as will be seen by herbarium specimens presented to the Society for examination, and also by the accompanying paintings, executed on the ground in water colors.

This species is ascending in habit, about two feet high or less, with mostly simple stems, lanceolate-oblong leaflets; large purple flowers followed almost surely by abundant bolls of seed. The tubers are produced upon long, slim, white stolons, and are depressed oval in shape, from one-half to an inch in diameter, and of a purplish color when first exposed to light. It will be noticed that the leaflets of this plant have occasional minute leaflets interposed. This character connects closely to cultivated sorts, and is used by the authorities to separate this species from the next, but we have noticed that this feature is common to all, though in varying degrees.

The second species, *Solanum Jamesii*, was sparingly collected by Dr. James, of Long's exploring expedition to the Rocky Mountains of Colorado, and was named in honor of Dr. James. The plant is usually smaller, with prostrate branching stems, longer and narrower leaflets (the minute, interposed ones being fewer), a less number of flowers to the umbell, which are white

and more deeply incised into lobes. The stolons are usually much shorter and the tubers are smaller, nearly round, and when first dug are of a beautiful creamy white color.

Both species were found growing side by side, on little benches of alluvial along streams on the slopes of the Huachuca Mountains of Southern Arizona. We also found them invading the few gardens of the region at lower altitudes, flourishing among the cabbages and monster snow-flakes as though friendly to cultivation and inviting attention. For popular convenience, these species may be discussed as the purple and the white potatoes.

Perhaps a third species may be yet derived from plants found near the summit of the highest peak of the Huachuca, at an altitude of 9,000 feet. This potato, as shown by the specimens accompanying, has its leaflets simple or at most in threes, while its stolons sometimes originate from the aerial portion of the stem, running out over ground a long distance, then turning downward with sharp, needle-like points that penetrate the earth and finally bear tubers at their extremities. However, plants raised from seeds of this kind, last year, presented multiparted leaves, subterranean runners, and it behaved in other respects like the purple potato first described. Seedling tubers and fresh seeds of this plant are herewith shown, and the remarkable fact discovered that the tubers are largest of all the specimens produced this past season.

Simultaneously with the announcement of this re-discovery and obtainment of a stock of native potatoes, I notified cultivators that these tubers would be distributed for a small nominal sum on application. Many responded, representing all sections of our Union and several countries abroad. I required careful reports of cultivation, methods, success or failure, from all. A digest of the first year's report of experiments—that of 1883—was published in the *Pacific Rural Press*, of San Francisco, November 17.

SAMPLES OF REPORT OF EXPERIMENTS

Mrs. M. F. Williams, of Oakland, Cal : "In March we received one dozen of the Arizona potatoes, the largest of which measured not quite 2 inches longest circumference, and 1½ the shortest, the others much smaller. Planted them in April, in sandy loam, moderately enriched, and with a sunny exposure. Late in May we noticed seven tiny dark green shoots, which rapidly developed, and by the last of June the foliage was abundant. The plants were prostrate, spreading, and the leaflets narrow. In July, a few small blossoms appeared, but no seed-bolls formed. About October 14, we dug all the potatoes, and found that our seven plants had yielded 565 tubers. Six of the plants proved to be of the white variety, the other the flesh-color, the latter producing 63 potatoes. The largest of these was 3½ inches, longest circumference, and 2½, shortest; epidermis slightly warty. All averaged larger than the white. Largest of the white, 2½ inches, longest circumference; 2⅛, shortest. These potatoes are certainly very prolific, the yield being over eighty-fold. We are hopeful of success."

Prof. E. L. Case, Sierra Valley, Northern California: "I planted three of your Arizona potatoes, in rich alluvial soil, in my garden, in June. As they sprouted and grew two kinds appeared, and I soon recognized your printed description of the species. October 14, I dug them; the crop half filled a large cigar box. The largest are fully the size of English walnuts. I am well pleased with the result."

D. S. Marvin, Watertown, N. Y.: "You are but going over ground I have trodden faithfully for years, to no purpose; but you, nearer their *habitat*, may succeed by other methods than mine."

Dr. Gray writes: "Your Arizona potatoes will not amount to anything *as potatoes!*"—implying that they were only curious tuber-bearing *Solani*.

Prof. Meehan, of Philadelphia, in an editorial in the *Gardeners' Monthly*, alluding to my potato experiment, says: "I cultivated one of the species, *Solanum Fendleri*, several years ago, when distributed by Dr. C. C. Parry, and after eight years' trial, during which they ran all about in my borders, finally they lost out, I hardly know for what cause."

These opinions, pro and con, were elicited during the first year's experiment. The next, or the year just closed (1884), are quite encouraging:

Osgood Plummer, of Worcester, Mass., writes: "Your Arizona potatoes have been carefully cultivated two seasons, with the result as follows:

May 16, 1883.	Planted..	24	potatoes,	weighing.....	1½ oz.
	Product.	217	"	"	8½ oz.
May 24, 1884.	Planted..	217	"	"	8½ oz.
	Product..	2,060	"	" 145	oz.

"I have full particulars of soil, treatment, etc., which I will forward if desired. The first season they threw out long roots (stolons), and spread a great distance, and bore a profusion of seed bolls. This season but few bolls were perfected and the runners were much shorter. Among the tubers there are one hundred or more that are more than twice the size of the largest of the originals."

Prof. E. G. Mumford, Portlandville, N. Y., reports very frequently, and gives such careful particulars, showing that he is a thorough experimenter, that I close this topic with copious extracts from his last letter:

"I want to outline the method I have adopted, and give you my views as to best ways and means to develop these wildings to equal or even surpass the present stocks of potatoes, for I am thoroughly in earnest and decidedly hopeful.

"The year 1883 was spent in forming acquaintance with habits and peculiarities, ending in selecting at harvest time the best, earliest ripening seed-bolls, and the tubers having the shortest stems. I also endeavored to make a cross with several cultivated sorts, but failed in this.

"In 1884 I planted as many tubers as I could afford space for, with as much of the seed as I could care for, watching through the season closely for any

changes in plants, seed-bolls or tubers. I have repeated substantially last year's selection of stock for planting next year (1885), only having a much larger stock to cull from. I have drawn the line closer to what I desire to accomplish. * * *

"We must increase the size of the tuber, improve its quality and endeavor to retain all desirable qualities such as vigor, hardiness, capacity to resist disease, etc., and shorten the stems. How are we to do this? My plan is to select every year at the time of harvest the largest, best tubers grown within a circle of one foot, the closer to mother stem the better. Save only the seed-bolls of such plants. Sow the seeds, continuing to so select annually until the end, a desirable tuber conveniently located, is attained."

Then, after discussing the feature that the potato is not a root, but a condensed stem having all the properties of a branch, subject to bud-variation, etc., he continues:

"Some men, prominent in horticulture, and one particularly so in potato culture, pronounces these wildings utterly worthless. If the opinion entertained by Dr. Gray, that they are but marked northern varieties of the southern type, is correct, then why are they worthless, incapable of development?

"If Mr. Goodrich, from a few generations of seedlings (and those from the wild southern plants), gave us the only advance we have made for many years, if not in reality giving us a new potato plant for the dead old one, why may we not expect far better results from this northern form of the same plant?

"I hear of one man who had them under careful cultivation eight years, and they made no improvement. Now, I boldly assert that he might have continued to raise them for 800 years, every season selecting the largest tubers and replanting, and at the end of that long period he would have just what he started with—nothing more. I will admit that under exceptional climatic conditions, exceptional soil and culture he may have gained a little in size, and improved other features perceptibly, but all would be quickly lost by a return to normal culture. When we plant cuttings of the Concord grape we expect a vine of the Concord. When we graft a scion of the Rhode Island Greening we expect a tree of Greenings. When we bud a luscious early peach we do not expect to rear a tasteless frost blight.

"So with potatoes, which are but condensed stems of buds. We reap what we sow; we dig what we plant. It is true there is bud variation, but it is very slight; does not often occur except with plants long under cultivation. When they do occur they are liable to be unstable and may at any time revert. I have cultivated a great many varieties of potatoes said to be sports of various well known sorts, but never had one that proved permanent, and the notion with me is gaining ground that these sports are, to some extent, signs of failing vigor, perhaps of disease. * * * Past experience indicates that plants raised from the seed, on the contrary, as a rule are stable. While many of the plants raised from seeds may prove inferior to their parentage, a few are almost certain to advance the standard, and the cultivator should

have a clear conception of what he desires to produce, and an eye quick to perceive any tendency to that end, and by careful circumspection he will soon be able to pick the plants that are desirable to retain almost as soon as they pass from the seed leaf, and so save a vast amount of unnecessary labor. * * *

"I had two plants of the new potatoes this year that surprised me very pleasantly. Every tuber was formed within less than twelve inches from the stem, most of them lying as compactly in the hills as our best cultivated sorts. I consider this a great advantage gained and I keep these tubers for first-class seed stock. Also I saved their seed for planting, and hope to have this feature fixed as a confirmed character. So far I have planted in what may be called good garden soil, avoiding stimulating manures. * * * In conclusion I desire to place on record again the prediction that in less than ten years we will be using the product of these northern wildings on our tables, and that from their seedlings we will, within that time, obtain some of the earliest and best potatoes in cultivation."

In conclusion let me present a few suggestions derived from observations of the plants in their homes and the treatment they receive at the hands of, the aborigines.

Whatever may have been the size or the behavior of these wildings originally it is not strange to me that they are now practically worthless. Indeed the Indian treatment of them would tend to produce precisely such tubers as we find.

The Navahoe squaw never plants a potato or sows a seed, much less cultivates them with the hoe, or frees them from the encroachments of weeds. She simply *digs* them Armed with a basket and a sharpened stick, or lately with a railroad spike, she seeks the nearest potato patch, selects the largest plants, squats on the ground beside them and digs up all the ground about them. This process brings a few of the tubers to the surface, from which she picks the biggest for her basket. The small potatoes, and those that have run off and hidden under stones or roots, are the ones that are left from year to year and age to age to perpetuate the species, so that small potatoes on long stems are legitimate products of squaw treatment. In this connection compare the two species exhibited. The purple potato trying to give us a large tuber is compelled to run away off to deposit it where their centuries old, ungrateful beneficiaries can not find and destroy this, one of the most promising of late discoveries, Native Arizona Potatoes.

DISCUSSION ON PROFESSOR LEMMON'S PAPER.

Prof. Popenoe, of Kansas—I found *Solanum Jamesii* at Trinidad, Colorado, in 1881, growing as a weed among beans in a Mexican's garden. Cultivating them in a green-house, I have succeeded in raising new tubers, but not of increased size, though I have not yet

succeeded in flowering it. Col. Henry Inman, of our State, familiar with the habits of the native New Mexican, has told me that they attempt to eat these tubers, but find them a violent purgative, and unhealthy. I would like to ask Prof. Lemmon, if out-door planting would, more likely, produce flowers in the Central States?

Mr. Caywood, of New York—If there is anything in the improvement of this tuber not accompanying the improvement of the South American species, we want to know it. I am emphatically of the opinion that we will need to depend on the wild tuber, as our cultivated sorts are failing. Varieties are constantly running out. Year after year they are failing, simply because the planting of the tuber is the reproduction of the plant and not of the species.

Prof. Lemmon, of California — In answer to Prof. Popenoe, I would say that seed-bolls are readily found on plants grown out of doors. I can not positively say that the product of our wild plants will produce more hardy sorts, but we may hope so, as many varieties are made delicate only by long and careless cultivation.

Mr. Caywood—Do you think that cutting the tubers of potatoes for planting tends to early degeneracy of the variety?

Prof. Lemmon—Yes, such is the verdict of the best authorities. Cutting the tubers certainly weakens the vitality of the plant.

Mr. VanDeman, of Kansas—Will freezing, out of the ground, kill these potatoes? The Colorado potato beetle attacks many species of the Solanum. I do not see why it will not feed upon these.

Prof. Lemmon—Many of the questions which you are propounding to me can be answered only by careful experimentation.

Mr. Brackett, of Kansas—The point raised by Prof. Popenoe is a good one, and I think is a law in horticulture. When we obtain quality in these potatoes, it will, probably, have been at the expense of hardiness. We will then be where we are to-day.

Mr. Harrington, of Michigan—I have some South American potatoes in my collection at the Exposition, which have obtained considerable size.

Mr. VanDeman —Are you sure, Mr. Harrington, that you have crossed the *Solanum Jamesii* with Mammoth Pearl?

Mr. Harrington—I am not sure; yet I think I have.

Mr. Allen, of Kansas—If the cultivated potato is frozen, even though it be in the ground, it will never sprout. It would be a boon if we oculd obtain a potato that will withstand even a slight frost.

REPORT OF THE COMMITTEE ON HORTICULTURAL HALL.

Mr. Gould, of Minnesota, submitted the following as the report of the Committee on Horticultural Hall:

We regard the structure known as Horticultural Hall as very happily adapted to the use for which it is supposed to be primarily intended—the exhibition of fruits and plants, which appear at much better advantage in a building lighted, as this is, mainly from above.

We also most fully approve the use of flat tables for fruit, which possess the important advantage of permitting an unobstructed view of the entire exhibit from any and all points. Had the entire surface of glass been painted the effect would doubtless have been improved during bright, warm weather, while it would not have proved objectionable at other times. How far this might have been unfavorable to the exhibit of plants we leave to others to say.

An important advantage would have been gained if even a moderate sized cold storage room could have been located immediately adjacent to the hall, and put in actual operation, prior to the opening.

We may also be allowed to suggest that the fruit would have longer continued bright, clean and attractive had the flooring been of a less dusty material.

DISCUSSION ON REPORT OF THE COMMITTEE.

Mr. Ohmer, of Ohio—What is it that we propose to do in this matter? Is it expected that we are to have future shows in this place?

Mr. Roe, of Wisconsin—We only desire, as horticulturists, to express our opinions, after a thorough trial, of the adaptability of this the largest and most expensive structure ever erected for the accomodation of a horticultural exhibition.

Mr. Gould, of Minnesota—Perhaps I am the real author of this movement. Some four or five weeks ago we were generally of the opinion that Horticultural Hall was not adapted to the wants of a pomological exhibit. We now find that we were mistaken, that our fruits are really keeping better than we could possibly have expected.

President Earle, of Illinois—The result of a thorough trial has

happily disappointed our exhibitors. The first expression of the exhibitors in the pomological division was one of doubt. It is now forty days since the opening of this Hall and we are all surprised to find fruits still in a perfect state of preservation. I have never known fruits to keep so well at any other exhibition.

Mr. Johnson, of Illinois—I have had large experience as an exhibitor of fruits, but have never known them to keep better than here.

Mr. Lyon, of Michigan—The committee has only desired to give the facts in reference to this structure. After more than thirty years experience as an exhibitor of fruits I have found that a vertical subdued light (not sunlight), is best for fruit. The shell floor of the Hall has been objectionable, as it is so dusty.

President Earle—The shell floor is all right when it is warm enough to admit of being sprayed each day.

Secretary Ragan, of Indiana—The whole object of this committee and of this Society is to compliment the management of this great Exposition in furnishing the best facilities for a horticultural exhibition ever provided. While the hall must, of necessity, have been constructed for the accommodation of both fruits and plants, we are happily disappointed in its admirable adaptability to this double purpose.

REPORT OF THE COMMITTEE ON DEATH OF CHARLES DOWNING.

Mr. Williams, of New Jersey, from the committee to draft resolutions on the death of Charles Downing, made the following report:

Mr. President and Members of the American Horticultural Society:

The telegraphic news of this morning informs us of the death, at his home in Newburg, N. Y., yesterday, of that venerable and eminent horticulturist, Charles Downing, who had recently more intimately connected himself with us, by remitting to our Secretary the membership fee for the ensuing year; your committee, therefore, submit the following:

WHEREAS, By the inevitable fiat which at last calls all to rest, Charles Downing, after a long, busy, and eminently useful life, has, by an inscrutable Providence, been removed from the scenes of his labors and afflictions; therefore,

Resolved, That we feel the irreparable loss of the acknowledged head of classical pomology in America; that the world can mourn no nobler, purer, or more efficient benefactor of mankind; that the deepest gratitude to his memory is due,

from every American, for his many rich and imperishable works on rural refinement and advancement; that though his days were ripe and full of the heaviest golden grain, yet we can not repress the most sincere expression of the deep-rooted love we bore him in life and the crushing sorrow that now wells up from our deepest sympathies, mourning his death.

Resolved, That in the *Fruits and Fruit Trees of America*, as first written by his brother, long since deceased, and subsequently repeatedly revised by himself, we possess a cyclopedia of pomology and a text book of this science destined long to exist as a worthy memorial of him and his life work.

Resolved, That we recognize in him one of the chief master builders of the grand structure of American pomology, a structure which, although scarcely a half century old, is already commanding world-wide attention and exerting a reflex influence upon the older pomology of Europe.

Resolved, That we tender to the friends and neighbors of the deceased, our sympathy in their bereavement and commend the careful, conservative and unselfish labors of Mr. Downing to horticulturists everywhere, as worthy of study and emulation.

All of which is respectfully submitted.

E. WILLIAMS, New Jersey,
T. V. MUNSON, Texas,
E. ASHLEY SMITH, New York,
T. T. LYON, Michigan,
Committee.

NEW ORLEANS, Jan. 20, 1885.

On motion of Prof. Lemmon, of California, the resolutions were adopted by a rising vote, after which the following members made

REMARKS ON THE LIFE AND CHARACTER OF MR. DOWNING.

Mr. Caywood, of New York—No man ever held a higher place in the estimation of his neighbors and near acquaintances.

Mr. Plumb, of Wisconsin—As to Mr. Downing's high standing in pomology none will doubt. Personally, I wish to express my appreciation of his character in one or two points. He was a model correspondent, and a most searching student of pomology. We will learn to appreciate him and his services to pomological science more and more as time advances.

Mr. Williams, of New Jersey—I have known him for a quarter of a century, and have never known a more modest Christian gentleman. During his recent long and severe bodily afflictions he never forgot his love for his chosen calling, nor did he neglect his numerous correspondents. When he could not write himself, he

dictated his letters. His death leaves a void in our ranks which we may not expect soon to see filled.

Maj. Ragan, of Missouri—Mr. Downing was an earnest, devoted laborer in the cause of horticulture; one whose works, most truly, "do follow him."

Mr. Lyon, of Michigan—Mr. Downing was the most accurate pomologist of his age. He was rarely mistaken in the determination of synonyms. He collected and preserved most carefully, even after his accident, and indeed until death, a careful memoranda of all his observations and investigations. His work is not yet done. We are yet to derive important knowledge from the results of his unpublished investigations.

Mr. Caywood—He leaves no family. His only relatives were his brother's widow and a niece.

Secretary Ragan, of Indiana—I have never had a more prompt and ready correspondent than was Mr. Downing. Even since his affliction I have never had him neglect to answer, and in the most prompt manner, a letter, even of minor importance. His research, in the line of pomological investigation, was truly wonderful. He solicited contributions of new varieties, often at great personal expense, from all possible sources, and by close comparison determined their proper place, either as synonyms, or as really new sorts. In one of his last letters to me (which see appended) he inquires after a western apple of which he had read. He has, at all times, cherished the work of our Society, and, indeed, of all kindred societies, and promptly recognized and acknowledged their valuable aid to horticultural and pomological science.

On motion of Col. Brackett, of Iowa, the Secretary was directed to forward a copy of these resolutions to the family of Mr. Downing.

(NOTE.—Believing that the following extract from the *Prairie Farmer* and, also, personal letters from Mr. Downing, will be read with interest in this connection, the Secretary presents them without apology or comment.)

"In a quiet, brief way, the press has announced the death of Charles Downing, the distinguished horticulturist, at the ripe age of 84. Perhaps this quiet notice is a tribute of respect to the modest, unassuming worker, who, for three-fourths of a century, has signed his name in very small letters—C. Downing. * * In Col. Wilder's eloquent and truthful Eulogy on A. J. Downing, is found this suggestive

passage: 'But he, following the native tendencies of his mind, preferred to remain with his elder brother * * whose accuracy and practical skill in horticulture gave special prominence to the same traits in the deceased, and with whom he might study the theory, and perfect himself in the practice of his favorite art.'

"At that time the versatile and brilliant A. J. Downing was sixteen years of age, and the solid, earnest delver after horticultural truths, whom we now lament, was a mature man of thirty. At this very early date in our pomological history, Charles Downing was a corresponding member of the leading horticultural societies of Europe, and was a quiet leader in advancing horticulture on the Hudson and in the New England States. During the next twenty-one years, the public hears little of the modest, retiring Charles Downing, while his talented and versatile pupil astonished the conservatives of the old world with his 'Landscape Gardening,' at the early age of twenty-six. Then came his 'Cottage Residences;' then the volumes of 'Downing's Horticulturist;' and in 1845, when but thirty years of age, appeared the 'Fruits and Fruit Trees of America.'

"All these works, of which Americans are justly proud, show the 'methodic, sometimes abrupt, but always versatile and flowery' style of the younger brother, but the thousands of European and American correspondents of Mr. Downing of the past half century need not be told that Charles was the great laborer of the age in the field of untangling the confusing nomenclature of the fruits of the temperate zones. Nor need they be told that since the untimely death of the younger brother, the quiet, retiring, silent *partner*, has issued several editions of his brother's great work, with intervening publications in Appendix form.

"For over a half century his modest statements of the facts pertaining to the fruits, and the home surroundings, have been eagerly read in every prominent industrial publication. He has also been first and foremost in every movement for the advancement of agriculture in its many divisions. As with the sunshine, or the air we breathe, the quiet work of Mr. Downing has been an acknowledged blessing we have taken as the established order since most of us were children. He now rests quietly in the sepulchre of his fathers, on the banks of the river he knew so well as a boy. We shall miss his sage advice and counsel, and the real value of his lifework will grow as the years go on.

"It will specially gratify all horticulturists of the West to learn that the valuable horticultural library of Charles Downing, including most of the rare works published by subscription in Europe and America, for the past sixty years, has been willed, as we learn, to the Horticultural Department of the Iowa Agricultural College, and his many volumes of posthumous papers have been bequeathed to Prof. J. L. Budd, who has charge of this department in that institution. This bequest is characteristic of the man. It recognizes the idea that the College is trying to do advance work in its industrial department, certainly in the pomological field. It is not unlikely that Mr. Downing took into account the fact that this Institution, and the State, are located very near the center of our broad country, and thus fittingly become the depository of the treasures that were begun to be collected at a time when the Hudson was almost on the western borders of horticultural advancement."—*Prairie Farmer.*

W. H. Ragan, Esq.: NEWBURG, N. Y., July 26, 1884.

DEAR SIR—Please accept my cordial thanks for a copy of the Transactions of the Mississippi Valley Horticultural Society for 1884. I have been very much interested and instructed with contents of the volume, and, if generally read and practiced by the people, would be of great benefit to the State and the country.

I have just received your card relating to the doings of the Society and enclose you $2, and will thank you to send me the volume for 1885, although it is very uncertain if I live to see it. My back was injured by cars in New York City, some eighteen months since, so that I have but little use of it, and can only walk a few rods at a time, and as the spine is affected, the prospect is not encouraging.

With best wishes for your health and welfare,

I am, very respectfully, CHARLES DOWNING.

W. H. Ragan, Esq.: NEWBURG, N. Y., August 4, 1884.

DEAR SIR—Your kind letter of the 30th came in due time. I am thankful for your kind expressions as to my health and welfare, and, also, for what little I have done in the cause of pomology. * * *

I am surprised to hear that there is a want of energy among horticulturists of means to help on the good work of the Association. I would be glad to assist, but my means are limited and only sufficient to meet my yearly expenses. Wishing you good health, a long, useful and happy life,

I am, very truly, yours, CHARLES DOWNING.

P. S.—The Tennessee people are praising the Ragan's Yellow Apple. Do you know anything about its origin, etc., or is it some old variety with a new name?

Mr. Lyon, of Michigan, for the Committee on Nomenclature, reported the following:

REPORT OF THE COMMITTEE ON NOMENCLATURE.

To Hon. Parker Earle, Chief of Department of Horticulture, and President of the American Horticultural Society:

SIR—The undersigned judges in the Department of Horticulture of the New Orleans Exposition, charged with the duty of correcting the nomenclature of the fruits on exhibition in Horticultural Hall, have found the time, prior to the action of the awarding committees, quite inadequate to the full and proper performance of this duty.

It is not clear to us that a report of our doings in this matter is either needful or expected.

The Society, however, which you represent as President, is understood to be, at least constructively, in charge of the exhibit; and, since the result of our observations and experiences, in the performance of this duty, may prove useful, in its recently assumed position as an American Society, we respectfully submit the following report, with suggestions, for its consideration.

It seems to us important that awards be made only upon specimens entered for

premiums under correct names. Hence the necessity that incorrectness to name be distinctly indicated by the card of the committee on nomenclature, as a warrant to the awarding committee for excluding it from the competition.

The importance of the simplification as well as purification of the nomenclature, not of pomology only, but of horticulture as well, has already come to be realized and generally admitted.

Since these two propositions lie at the foundation of the rules adopted by the American Pomological Society at its last session, and deeming it of the highest importance that there be entire unanimity in the practice of the two Societies in these particulars, we recommend that these rules be also adopted by this Society (if not already done), and that they be made, in its practice, to cover the entire field of horticulture.

America is a very broad region, embracing people of various languages. In view of the present field of the Society's operations, as well as the general prominence of the English tongue, it seems appropriate to declare that its discussions and records shall be in that language; and also, that, with the concurrence of its elder brother, The American Pomological Society, it adopt the practice (in using the names of varieties of foreign nomenclature) of translating such names, so far as they shall be translatable, transferring only in necessary cases; but, at the same time, respecting the nomenclature of botany.

Much of the most effective work of a committee on nomenclature can best be done at leisure, during the recess of the Society. It is furthermore true that very few persons are adepts in the entire field of horticulture. We recommend, therefore, that the Society institute a standing committee on nomenclature, to consist of a general chairman, with one member from each geographical division, so far as shall be deemed desirable; such member to be the local chairman for his district, and to be authorized and required to appoint as many expert assistants in such district as he shall deem needful, whose duty it shall be to report periodically to him, and through him to the general chairman. The general chairman, together with the local chairmen, to constitute the acting committee on nomenclature at the Society's exhibitions, with power to distribute such work among its members as shall be deemed advisable, assigning each to the class with which he may be most familiar.

T. T. LYON,
G. B. BRACKETT,
GEO. P. PEFFER,
Committee on Nomenclature.

FINANCIAL CONDITION OF SOCIETY—DISCUSSION ON.

Mr. Caywood, of New York—I understand that our Society is unable, financially, to pay our Secretary a salary. I move that we investigate this matter.

Mr. Roe, of Wisconsin—This should be the work of a committee that should report at our next meeting. Let us have a committee of five, to report to-morrow evening.

On motion, the committee was made to consist of Mr. Roe, of Winconsin; Dr. Shaw, of Colorado; Mr. Kendel, of Ohio; Dr. McKay, of Mississippi; and Treasurer Evans, of Missouri.

After a general discussion, participated in by many, with suggestions numerous, on the subject of finances, including the possibility of securing Congressional aid in carrying forward the work of the Society, it was, on motion, agreed to adjourn to meet in President Earle's parlors to-morrow evening.

PRESIDENT EARLE'S PARLORS,
THURSDAY EVENING, JANUARY 22, 1885.

At 8 P. M. President Earle called the meeting to order.

Mr. Roe, of Wisconsin, from the committee appointed to recommend a plan for securing better financial support for the Society, submitted the following:

REPORT OF FINANCE COMMITTEE.

1. *Resolved*, That, in order to meet the emergencies of our treasury, each member be requested to pay the sum of five dollars or more, and for each five dollars thus paid the Secretary is hereby directed to issue three certificates of membership and three copies of the Transactions of the Society for the past and current years; and said member complying with this resolution may fill the blanks with such names as he may see fit.

2. *Resolved*, That the Secretary be paid the sum of five hundred dollars for past services, and for the year 1885 the further sum of one thousand dollars out of any moneys not otherwise appropriated.

3. *Resolved*, That the sum of (———) dollars is hereby appropriated to meet the contingent expenses of the President's and Secretary's offices, to be paid upon approved itemized statements, audited by the Executive Committee, and an order drawn thereupon on the treasury.

4. *Resolved*, That the Executive Committee of this Society be instructed to communicate with the Commissioner of Agriculture at Washington City, and ask for an official recognition of the American Horticultural Society as a channel through which horticultural information may be obtained. And that said committee ask for an appropriation from said department to publish our volume of Transactions under the supervision of our Secretary.

JOHN P. ROE.
ALEX. SHAW.
A. C. KENDEL.
H. E. MCKAY.

DISCUSSION ON THE REPORT.

Col. Babcock, of Arkansas, moved the adoption of the report.

Dr. Shaw, of Colorado, moved to amend by filling the blank with $400.00.

Mr. Kellogg, of Wisconsin—It is easy to promise, but can we meet such appropriations?

Secretary Ragan, of Indiana—I do not think we should fix upon any definite sum for either contingencies or salaries. If we wait for Congress or the Commission of Agriculture to help us we may wait indefinitely. I am in favor of helping ourselves. The way out is for each member to aid in extending our list of members. The fees will keep up our expenses if we double our list of members.

Dr. Shaw, of Colorado—There should be a definite sum set apart for current expenses, also the Secretary's salary should be a definite sum, not less than $500. The Agricultural Department should appropriate enough to publish our Annual Transactions.

Mr. Roe, of Wisconsin—There are few of us that can not secure three additional members, and some of us can do more. I am quite sure that I can get twenty in our local Society when I go home.

Col. Babcock, of Arkansas—We have a resolution making a very liberal appropriation but no money back of it. Each of us should constitute ourselves a committee of one to secure new members. I think I can get twenty or twenty-five when I go home. If we get one thousand members—not an impossible thing to do—we are all right.

President Earle, of Illinois—When we get some money the Executive Committee will pay our Seeretary.

Dr. McKay, of Mississippi—The plan suggested by the committee is, of course, subject to amendments and changes by the Society.

Dr. Shaw—I think it better to fix a definite sum and then make it. If left undetermined we will not have done much to advance the cause of the Society.

Col. Babcock—We should first devote our energies to increasing our membership.

Mr. Williams, of New Jersey—We should not appropriate what

we have not got. Let us first understand where this money is to come from.

Mr. Kendel, of Ohio, moved to amend the amendment, to insert in place of the blank, "the necessary expenses," which was accepted by Dr. Shaw.

Col. Babcock—Would it not be well for us to defer action on this report until another meeting, in the meantime, see what we can do to increase our list of members.

On motion of Mr. Hoffman, of Kansas, the report and pending amendments were taken up *seriatim.*

The first clause was then read and adopted.

On motion of Mr. Williams, the second clause was amended by striking out all after the word "services."

The second clause as amended was then adopted.

The third clause was not adopted.

The fourth clause, after some favorable remarks by Drs. McKay and Shaw, was also adopted.

The amended report was then read and adopted as follows:

Resolved, That, in order to meet the emergencies of our treasury, each member be requested to pay the sum of five dollars or more, and for each five dollars thus paid the Secretary is hereby directed to issue three certificates of membership and three copies of the Transactions of the Society for the past and current years; and said member complying with this resolution may fill the blanks with such names as he may see fit.

Resolved, That the Secretary be paid the sum of five hundred dollars for past services.

Resolved, That the Executive Committee of this Society be instructed to communicate with the Commissioner of Agriculture at Washington City, and ask for an official recognition of the American Horticultural Society as a channel through which horticultural information may be obtained; and that said committee ask for an appropriation from said department to publish our volume of Transactions under the supervision of our Secretary.

The following resolution was then offered by Dr. McKay, of Mississippi:

WHEREAS, Owing to the approaching change in the national administration, and the probable change in the Commissioner of Agriculture, therefore be it

Resolved, By the American Horticultural Society, That we recognize in Ex-Governor Colman, of Missouri, editor of the *Rural World*, a man well suited to fill this important department of our government.

President Earle—Colonel Colman is a man admirably fitted for the place. In addition to his other good qualities, he is a live, wide-awake Western man.

Mr. Jessup, of California—There may be a question of propriety in this matter. Our Society should steer clear of political complications.

Mr. Kellogg, of Wisconsin—I think it is perfectly right for us to pass this resolution.

On motion of Col. Babcock, of Arkansas, seconded by Mr. Hoffman, of Kansas, the resolution was laid on the table.

Dr. Shaw, of Colorado, spoke at some length on the resources of his State, ably presenting its claims to the fruit grower. He referred with pride to the collection of fruit on exhibition from the irrigated lands of Colorado.

This called forth similar remarks from Dr. McKay, of Mississippi, and Mr. Jessup, of California, lauding their respective States and especially their adaptability to fruit growing.

Mr. Jessup, of California, made a verbal and adverse report from the committee appointed to consider the claims of the pending Louisville Exposition, which report was adopted. After which, on motion of Mr. Kellogg, of Wisconsin, the Society adjourned to meet on call of the President.

ADDITIONAL PAPERS.

Although the Society did not adjourn *sine die* at its last meeting, owing to the indisposition of President Earle and other causes there were no further meetings held. This left a number of valuable papers in the hands of the Secretary which had not been regularly presented, partly from the fact that they were not accompanied by their authors to have read them in person, and partly for the want of time. They are, however, no less meritorious, and the Secretary in publishing them in this connection bespeaks for each that attention at the hands of the reader that they so well deserve. SECRETARY.

THE NUTRITION OF PLANTS.

BY T. J BURRILL, PROFESSOR OF BOTANY AND HORTICULTURE, ILLINOIS UNIVERSITY.

The water contained in living plants constitutes by far the greater proportion of their weight. The amount is by no means constant in the same tissues, much less the same in different parts of the same plant. A succulent, growing shoot of a tree will lose nine-tenths of its weight by drying, while a ripe seed from the same tree may not lose more than one-tenth, by the same process. The wood of a healthy apple, or oak, loses by drying, at a temperature of boiling water, nearly or quite one-half of its green weight; and what will be surprising to some, the heart-wood will lose as much as the sap-wood, except the cambium portion of the latter during or soon after the season of growth.

This large quantity of water exists as water, unaltered in any way, though usually having dissolved in it several other substances. Yet the water is essential to the physiology of the plant, not indeed as food, but for necessary physical or mechanical processes of life and growth. If the amount of water is much reduced by any means, the plant flags, or wilts; the cells lose their

normal turgidity, and every life function ceases. In the ripening process water is expelled, but in a very different way from evaporation by heat. Desiccation by external means does not ripen the tissues. The latter may be prevented, by withholding water, even more readily than induced, unless careful attention is paid to the condition of the plant at the beginning. The point here is, that this large amount of water in living plants—amounting to four-fifths their weight—is essential to them; necessary to their continued existence, and to their normal development.

But this is not all. About one-half the weight of the dried substance of plants is water in another form. It is not really water as it exists, but the elements of water, and these, along with carbon, make up the solid substance of the plant. The water elements are oxygen and hydrogen, one part of the former to two of the latter by bulk, or, by weight, of eight to one; and these proportions remain the same in the composition of wood, or rather of the substance called cellulose, of which wood mainly consists. When plant-tissues have been thoroughly dried in an oven kept at 212° Fahr., one might suppose that there could be given off no more water from the hard, perhaps brittle, substances. But if these are now burned, the most of the material passes off, as we know, as gases. If the combustion is imperfect, there is more or less visible smoke; but if the material is completely oxydized at first, nothing escapes which can be detected by the eye. Now nearly one-half these invisible products of the burning, kiln-dried wood is the vapor of water, which has only to be cooled to reach the liquid state. In the process of combustion, the water elements are united again with each other, but the combinations in which they were held in the wood are broken up.

It thus appears that the abundant substance which we know in nature as a typical liquid, the type of instability, the most impracticable thing possible one might think in building solid structures really does constitute something like nine-tenths, in one form or another, of the frame-work of plants. If so, surely the first place should be given it in a discussion of plant nutrition. Water is used in abundance as a necessary part of the plant tissues, in a mechanical sense, and it is used as a true food substance, constituting in a chemical sense a considerable portion of the solid material of the plant structure. In the former it remains water; in the latter condition it is no longer a liquid, but joining in a molecular sisterhood with carbon forms the wood substance of plants.

Experiments have conclusively proved that plants obtain the water which they require, for one or both the purposes just mentioned, through the roots and through the roots only, if we confine ourselves to our garden and field crops. It is very often supposed that leaves absorb moisture from the air, and because wilted plants revive at night when the dew settles upon them, this is supposed to be proved. So when a potted plant is allowed to wilt for want of water it may often be seen to regain its normal condition by sprinkling the top with water in such way as to give none to the roots. But these things are entirely possible without absorption by the leaves. As the roots

are actively absorbing water from the soil during the time, it only requires that evaporation shall be less than the supply furnished for the revival of the plant. When the loss of water above is greater than the amount absorbed—however great the latter—wilting must occur; but revival ensues as soon as the evaporation is sufficiently checked to allow an accumulation of the fluid absorbed by the roots. Sprinkling the leaves simply reduces the evaporation from them, and permits the activity of the roots to sufficiently furnish the tissues with water. It is, however, a fact that badly wilted leaves do absorb some moisture from a saturated atmosphere, but turgid leaves do not, and practically, in the former case, the amount so obtained is scarcely worth considering. We may say that all the water obtained by plants, for whatever use, is furnished from the soil through the roots.

One of the most remarkable things about this is, that land plants are capable of extracting from soil which seems dry, sufficient water for their use, not only as already mentioned, but to provide also for the marvelous quantity constantly exhaled from green leaves—amounting on an average to one and a quarter ounces for each square foot of leaf surface in favorable weather during twelve hours of daytime. As there is on a large forest tree 200,000 square feet of leaf surface, the amount sent off from its foliage, each sunshiny summer day, reaches the astounding total of seven and three-fourths tons, or nearly fifty barrels of forty gallons each! With ten such trees to the acre, we shall have 500 barrels given off from this area. Experiments have shown that an acre of beets throw into the air each favorable day about eighty barrels of water, and this may be taken as a low average for fields of cultivated plants. Maize and sugar cane must give off very much more. Taking this eighty barrels as a basis, think of 51,200 barrels of water pumped from the soil into the hungry air for every square mile o land each fair summer's day—2,816.000,000 barrels from Illinois in the same time! This represents something over one-eighth of an inch deep over the whole surface. If the plant does owe much of its substance to water, it is amazingly prodigal of the precious liquid! It however must be borne in mind that the figures mentioned are for weather specially favorable for evaporation. During the night and in cloudy days little is exhaled. A clear sun, a high temperature and a brisk breeze greatly promote the transpiration of water from green leaves.

To obtain their enormous supplies of water from the soil, plants are excellently equipped, in the great development of their root systems, and the clothing of their younger portions by myriads of exceedingly slender epidermal cells, called root hairs. Taking the latter into account, it is probable that the root surface of a tree is fully equal to that of the stem and leaves. If a large forest tree has anything like five acres of absorbing root surface, it is not so astonishing, after all, that fifty barrels of water per day can be supplied to the plant. The extent of roots is far greater than usually supposed. On our Illinois prairie soil, blue grass in pastures sends down roots in considerable numbers five to six feet; clover often twice that depth.

Apple trees in eight years have been found to send out roots horizontally twenty feet from the trunk; a Concord grape-vine in two years produced a root which was followed thirteen and a half feet; a Lombardy poplar developed roots in abundance beneath an old woodyard seventy-five feet distant from the trunk. In New Hampshire the living roots of an elm are authoritatively said to have blocked a drain tile 400 feet from the base of the tree! Whatever may be said of this last, the others are vouched for by myself, and were observed when the subject was under investigation, so that the closest examinations were made and mistakes rendered improbable, if not impossible.

One thing further needs to be noted, viz.: that the roots of most land-growing plants are not only fitted for the absorption of moisture from soil without free water, but do their best work when there is visible water about them. In most such cases plants suffer when their roots are immersed in standing water. Among other injuries, the root hairs perish. The roots of purely aquatic plants have no root hairs.

The next substance in order of quantity in the structure of plants is carbon. This composes nearly one-half the weight of the dried wood. We see it retaining the perfect shape and size of the original structure in carefully-prepared charcoal. In the manufacture of the latter the water in the two states above described is expelled and the carbon alone retained. The amount, though by no means so great a proportion of the green plant as is composed of water, is in the aggregate very large. For every ton of green wood we may estimate about one-fourth or five hundred pounds of carbon. Vegetation gives us the only supply we have of this material in the free state; the coal dug from the earth is only the preserved carbon of former plant growths. Even plumbago and the diamond are believed to owe their origin to the assimilative activities of green plants.

This substance is obtained by the living plant in the shape of carbonic acid, and is for the most part absorbed by the leaves from the atmosphere, in which it is constantly present, and upon an average constitutes four parts in every ten thousand parts of the gaseous envelope of the earth. It also enters the roots, being absorbed to some extent in water, and thus ultimately gains the leaves, where at all events it must go before becoming of service to the plant as food. The process called assimilation in the green parts, under the influence of light, is the one striking and characteristic phenomenon of vegetation. In this process the carbonic acid is separated into its constituent elements, carbon and oxygen, the former retained and the latter given off to the air. As there is a strong chemical affinity between these elements, an expenditure of force is required for their disassociation, and this force is believed to be furnished by the sun. Man, however, has not yet been able to imitate the leaf in directly utilizing after this method the light and the heat sent freely upon us. Possibly he may learn how some day, and be able to set up a manufactory of starch out of carbonic acid and water; thus making food for himself from the abundant supply of the air and of a

spring or well! In the meantime, however, we may best content ourselves with the food supply gained from plants, and be thankful accordingly to our tireless benefactors of the vegetable world.

The continued supply of carbonic acid in the air is secured through the various forms of decomposition and combustion—the decay of animals and plants, the exhalation of the former in the breath, and the products from all domestic and commercial fires. The atmosphere serves as a great reservoir which is continuously filled and as continuously emptied in an even and ceaseless balance of account. It is rare indeed that carbonaceous manures need be added to soils for the food supply of crops growing thereon. These fertilizers have other important uses in the various physical or mechanical properties of soils; but plants ordinarily have abundant opportunity to help themselves to the carbon required from the air, providing other things are favorable.

In the combustible substances of plants there is one more element which demands our attention—nitrogen.

This exists in a free state in immense quantity in the air, composing four-fifths of its bulk. But plants are not capable of making use of this free nitrogen. This question has been long in dispute, but the weight of evidence is as stated. Bathed in an ocean of the substance, plants, like ourselves, must perish for want of it, unless supplied in combination with other chemical elements, forming the so-called nitrates. Now these nitrates are not spontaneously formed in nature, or rather are formed only under certain conditions and through the mediation of peculiar agencies. No problem in plant nutrition has been so difficult to solve, nor so faithfully wrought, as this of the source of nitrogen as a food material for plants. Important knowledge has only recently been gained upon the subject, and it has not been until very recent years that anything like positive assertion could be made on many debatable points. Our knowledge now may be summarized as follows:

1. Plants can not in any way use free nitrogen as food; neither can any plants whatever cause a combination of free nitrogen with other elements so as to produce assimilable nitrogenous matter.

2. The soil does not in any way fix the free nitrogen of the atmosphere so as to render it useful for plant food.

3. The unique, original source of assimilable nitrogen, capable of serving for the nutrition of plants, and in consequence the original source of the nitrogen of all animal foods, is in the chemical combinations, induced by electricity, of free nitrogen and of oxygen or hydrogen (of watery vapor) in the atmosphere.

4. The nitrates formed in the soil—the results of the so-called nitrification of soil—are due to a fermentation of nitrogenous organic substances by which ammonia and nitric acid are set free and the latter fitted for uniting with the alkalies or alkaline earths. This fermentation, like all other such processes of decomposition of organic matter, is due to living organisms. The particular species of microscopic plants (bacteria) which produces this par-

ticular fermentation, is present in all fertile soils, and really constitutes one of the factors of fertility.

5. Plants do absorb assimilable nitrogen by their leaves (ammonia); but the most of this food element is taken into the plant through the roots, and hence from the soil.

These things, as has been stated, are conclusions reached through the most patient and laborious experiments and investigations, the results of which have often been, to all appearances, contradictory and, at the time, unexplainable. But at least some of the difficulties have been in late years removed, and one comes to have much confidence in the conclusions reached. Yet it is even now reported that a prominent American chemist finds that plants under normal circumstances do absorb and assimilate free nitrogen, and he accounts for the contrary statements by so many careful and skillful experimenters, by supposing the test plants were not under natural conditions, especially were not exposed to the atmospheric electrical currents as were his own.

The point which cultivators need most to observe is, that soils, in the ordinary processes of cropping, grow constantly poorer in the nitrogenous supplies, for the amount of ammonia and nitric acid brought down by rain and dew over the given area is much too small for the annual demands of thrifty vegetation. No system of crop rotation or of green manuring can indefinitely perpetuate the fertility of soil. The time must come, sooner or later, when artificial application of nitrogen-forming material is a necessity for continued luxuriance of plant growth. Were it not that there is such a constant formation of assimilable nitrogenous compounds through the agency of electricity, the world must soon become uninhabitable. Were it not for the fermentation of dead organic matter through the agency of living organisms, each of which requires a magnifying power of at least five hundred times across to become visible to the human eye, there could be no crops, such as we now depend upon.

Under the most favorable circumstances, tillers of the soil ought to understand how best to economize the nitrogen supply in soils, and this becomes an imperative necessity in regions less favorably or fortunately situated. With the knowledge now at command, man has it in his power to perpetuate in this respect the priceless value of high fertility, or to vastly improve upon the natural richness of soils in some localities. On the other hand, from the want of knowledge or attention, he may soon set in operation great natural phenomena which bring in their train poverty and barrenness—a curse not only to one generation of human beings, but to the struggling populations of future centuries, an inheritance of suffering and destitution, instead of the helpful richness of our good Mother Earth when properly treated.

I will only add, here, that severe midsummer droughts, and especially upon bare surfaces unprotected from the burning rays of the sun by a beneficent screen of vegetation, followed at another time by deluges of water, are im-

mensely wasteful, even alarmingly destructive. The precious stores of fertility are exhausted by unprofitable combustion in the one case, and swept off to the sea in the other. Let us not be content to sit at the feet of Science; but, inspired and equipped by the best knowledge of our day, put into practice, with economy and intelligence, the best work of the world.

PLANTS IN THEIR RELATION TO DISEASE.

BY D. P. PENHALLOW, B. SC., OF QUEBEC.

In the year 1795 Schüger brought together the very meager and scattered literature relating to diseases of plants, and published it under the title of "Empirical Directions for the Correct Determination of Diseases in Forest and Garden Trees." This may be regarded as the beginning from which has since developed the now very important branch of botanical science which specially relates to disease, or vegetable pathology. At that time the science of botany was hardly more than an infant, and the special department of vegetable physiology was almost unknown. At that time also, the science of chemistry, upon which correct pathological knowledge is very largely based, was just entering upon a new era, and the more recently acquired facts were not then available in their application to the laws of vegetable nutrition and growth. It was during the period extending from 1770 to 1800 that we received from the hands of Priestly, Cavendish, Watt, and Lavoisier our first definite knowledge concerning the composition of the atmosphere and of water; and although these investigators instituted certain experiments to demonstrate the relation of these bodies to vegetable growth, their efforts were chiefly directed to the end of proving the effect of plants upon the soil and its various constituents. From this we will at once see how scanty and very unsatisfactory must have been the grand total of information in this direction. Everything pointed to recognition of disease by mere external peculiarities alone, nothing whatever being known of the actual sources of plant food and the specific relation of the various elements to the physiological processes of growth. Indeed, it was not until 1804 that special light was thrown upon this point when De Saussure in his "Recherches sur la Végétation," first demonstrated from the chemical analysis of wood ashes, that the mineral constituents therein contained were derived from the soil, and that the normal growth of the plant was therefore dependent upon a proper supply of food from this source, an opinion which was soon strongly indorsed by Sir Humphrey Davy upon the basis of actual feeding experiments. These researches gave a new direction to effort, and served to leaven the scientific mind with an unseen and slowly-working, but none the less powerful impulse, which was to make its influence felt in later years.

Following Schüger, no general work appeared until 1833, when Unger published his work, since which time the literature of the subject has rapidly

increased, chiefly, however, within the last few years, which seem to mark a period of particular activity in the field of vegetable physiology. And thus in this connection, such names as those of Loraner, Hartig, Frank, De Bay, and others have become very familiar. The tendency has been largely, however, to regard the question of disease from the standpoint of origin in visible cause, such as injuries of various kinds; the action of insects, and particularly the development of parasitic forms; overlooking to a large extent the more primary and possibly greater influence of nutrition. In this latter direction, however, we have the valuable results of Nobbe, Schroeder, Erdmann, and others, who, by their careful researches into the special nutrition of the plant, have essentially demonstrated in a very decisive manner what De Saussure inferred from his earlier experiments, viz.: that all the mineral constituents usually present in the ash of plants are essential to the normal growth and perfection of the organism; and that while certain constituents are relatively more important than others, complete exclusion of any one from the food supply will sooner or later result in more or less conspicuous malformation of structure or deblity of function. These relations were most strikingly illustrated in those now classical experiments with buckwheat, in which chlorine and potash were separately and collectively withheld. Depriving the plant of potash, it was seen that there was imperfect assimilation, as manifested both in the abnormal color of the leaves and the absence of starch from those tissues where it should have been present. Supplying potash but withholding chlorine, starch was found, but there was failure in its distribution to the centers of active growth, hence it became largely accumulated in the tissues where formed. As a necessary concomitant of this condition, the entire plant soon lost its normal color and became sickly and yellow, while there was also strong atrophy of the newly-formed organs. Restoration of the chlorine and potash in the form of muriate of potash seemed to restore the plant and its disordered functions to their normal condition. More recently, similar abnormal conditions have been found to be developed in the peach when suffering from the yellows, and a restoration has in this case been also fully effected by the use of muriate of potash as a specific. Indeed, the results obtained from direct experiment and analysis during the past fifteen years, as well as several hundred well attested cases in which the practical application of the principles involved to large orchards has given most decided and favorable results, show that, so far as this disease is concerned, we have already passed beyond the experimental stage, and may now reasonably expect to find those whose orchards are suffering from this most destructive disorder, ready to treat them according to rational methods.

We thus see that these elements of food have their specific functions, and so, doubtless, have the various other elements found in the ash of the plant. One fact in this connection, however, must be kept closely in mind, and that is, that particular elements, or compounds, do not necessarily perform identical functions in all plants. For the same species, certainly, and perhaps

for the same genus also, their functional value is the same, but the more distant the relationship, the more widely will the physiological characteristics of the plant be separated, and so will the special value of any element in the processes of nutrition and growth become subject to wider variations. This appears in a general way in the varying proportion in which these elements are taken up by the plant, so that while potash, for example, is demanded in relative excess by certain plants, in others soda seems to be the special base requisite to the given changes. And so with the muriate of potash, which Nobbe has shown to be essential to the metastatic changes in buckwheat, and which Dr. Goessmann has also shown to be necessary to similar changes in the diseased peach. When, however, this salt is applied to the pear, though belonging to the same family of plants, the result is not equally satisfactory, for here the action of the chlorine appears to be replaced by sulphuric acid, and so far as we are at present able to determine, the sulphate of potash—which has produced most favorable results in a number of cases—is the best form of special fertilizer for the treatment of blight. Therefore, in considering the relation of the nutrient elements to these changes, it is as impossible as it is unwise to attempt to dogmatically formulate a law of general application. Each subject must be treated according to its individual or family characteristics.

Of all the chemical elements known, somewhat less than one-fourth may be regarded as embracing the various constituents of the plant. They are: Mineral, as obtained from the soil, and constituting the inorganic portion of the plant—iron, manganese, lime, magnesia, potash, soda, phosphorus as phosphoric acid, sulphur as sulphuric acid, chlorine, silicon as silicic acid; and combustible, as obtained from the soil and air, constituting the organic portion of the plant—carbon, oxygen, hydrogen, nitrogen.

Of these we may consider the last four as absolutely essential to the constitution and growth of the plant, since they enter into the composition of that which is of fundamental importance – the protoplasm—as well as into the cellular framework. They can not be eliminated without disorganization of the structure. The mineral constituents are all derived from the soil in solution through the roots. The precise value of each is by no means well known, but certain it is that iron is essential to the proper formation of chlorophyl; silicon seems to exert an important influence as an element of strength; potash is directly connected with the function of assimilation, and so with the formation of starch and sugar, and so probably are both soda and lime; while the acids in general may doubtless be regarded as essential to those changes which are chiefly involved in the transformation of assimilated material as incident to the direct nutrition of parts. The general importance of these elements may be justly inferred not only from their more or less constant presence, but from the injury which follows their exclusion. We have also to consider that failure in the supply of any particular element does not alone cause a direct effect through disturbance of the particular

unction with which it is connected. The results are far-reaching, and indirectly involve other processes; as, for example, exclusion of iron would first of all result in failure of chlorophyl formation. Through this, however, starch and sugar would fail to form; the entire process of assimilation and nutrition would be disturbed; the respiration would become abnormal; the growth would become of a weak and succulent nature, and the whole plant would soon be brought into a condition which would make it the ready prey of parasitic growths, until it finally succumbed to death. We are thus led to see that we may have degrees of special or general debility corresponding to the degree in which the requirements of growth are met. Complete nutrition is an essential basis of health, and any deviation from it must result in arrest of function in some one or more directions.

Looking yet further to the causes which induce disease, we observe that cultivation at the hands of man exerts a well defined influence, which is manifested in a great variety of ways, and may be generally illustrated by functional and chemical changes.

It is well known, that under certain conditions plants often exhibit a special activity in one direction of development, to the more or less complete arrest of function in some other direction. This is true in cases where the power of vegetative reproduction through bulbs, offsets, etc., becomes largely developed, with a corresponding abortion of the sexual process. The general tendency of cultivation is to excessive vegetation, and not to reproduction; and conformity to this law is exemplified in the gradual obliteration of seed through conditions of high cultivation, as seen in many of our choicest modern fruits, which retain their abnormal condition just so long as the peculiar circumstances which tended to their development are maintained, but which rapidly revert to their original state when these conditions are withdrawn or an attempt is made to propagate through the seed. Furthermore, the peculiar conditions of cultivation which force the plant rapidly on to a premature development, bring the whole organism into a condition of unstable equilibrium in which the functions seem to be discharged under a state of high tension, and are not correctly balanced against the adverse influences of environment. This always serves as a predisposing cause of disease, and it is probably safe to say, upon general principles, that the more highly cultivated a plant, or the more the vital equilibrium is disturbed by conditions of growth, the more susceptible is the organism to disease.

While thus on the one hand cultivation may tend to induce certain disorders, on the other hand it may undoubtedly be capable of promoting certain changes whereby disease is not only warded off, but of inducing definite chemical changes for the permanent enhancement of the economic value of the plant or its parts, especially in those cases where the elements of nutrition are wisely controlled. In this connection the results obtained by Dr. Groessman in varying the ash constituents of fruits by cultivation, are most significant. Comparing the ash of the common wild strawberry (*Fragaria*

vesca) with that of a cultivated variety (Wilder), the following marked differences were noted:

	Wild.	Cultivated.
Potassium oxide	22.06	49.24
Sodium oxide	29.79	3.23
Calcium oxide	14.88	13.47
Magnesium oxide	Traces.	8.12
Fenic oxide	6.07	1.74
Phosphoric acid	14.47	18.50
Sulphuric acid	12.62	5.66
	99.89	99.96

These relations are most striking, but not more so than those changes actually accomplished in the wild grape (*Vitis labrusca*). A comparison of the ash of the fruit from a wild vine, with that of the fruit from a vine transferred from the same locality to the vineyard, where it was subjected to a careful course of treatment, gives the following:

	Wild.	Cultivated.
Potassium oxide	50.93	62.65
Sodium oxide	0.15	0.85
Calcium oxide	22.23	14.24
Magnesium oxide	5.59	3.92
Fenic oxide	0.79	0.53
Phosphoric acid	17.40	13.18
Insoluble matter	2.92	4.63
	100.01	100.00

These changes, chiefly in the lime, potash and phosphoric acid, were directly correlated to variations in the amount of sugar and to the development of other desirable qualities. They are most suggestive, and furnish ample food for deep reflection.

The influence of nitrogenous foods in stimulating growth is well known, and according to the principles already laid down, this stimulation constantly tends to the reduction of vital energy and the introduction of disease. Under such circumstances, influences which otherwise might long have lain dormant, now become active, and it is under such conditions that parasitic growths often secure their firmest hold to destroy. The judicious application of nitrogenous constituents in the food supply is a necessity of continuous growth; but these elements of food should bear a definite relation to those other constituents of food which tend to more perfect maturity of structure; or, as Lawes and Gilbert express it,* "A relative excess of nitrogenous supply favors the extended growth of the organs of vegetation, prolonging their development, it may be, until the resources of the plant are

* Mixed Herbage of Perm. Meadow, Phil. Trans. R. Soc. 1882, p. 1221.

exhausted or the season past. On the other hand, a relative excess of mineral manures may bring on premature ripening. It is the proper adaptation of the two descriptions of supply to the current requirements of the plant and of the season, that gives both full, properly-proportioned and well-matured growth." Nature, unmolested, preserves this relation; but it is seriously disturbed by that system of reckless cropping which man adopts in defiance of both nature and sound business principles. Active diseases arising from the causes thus indicated are only too familiar, as is well known in that disorder now causing such havoc in our peach orchards all over the country. Nor does the influence of the soil cease here, since varying conditions of moisture to an unusual degree, as well as the composition and mechanical condition, must have their well-defined effect, though it may not be to originate a disorder, but simply to hasten and augment the action of other causes.

Meteorological conditions exert an important and often determining influence in the development of disease. Combined warmth and moisture in excess are promotive of great stimulation, thus making it readily succumb to acute disease, and this fact, in connection with the well-known influence of such conditions in the promotion of fungoid parasites, enables us to see that their effect is of a twofold and somewhat far reaching character, though we may generally regard their action as indirect rather than direct. These conditions are beyond our control, but modern methods and appliances do render it possible for us to lessen their destructive influence in a very appreciable degree. Irrigation will counteract the effects of drought, but we may even go beyond this, and by the judicious application of manures, "adapting them to the requirements *of the plant* and of the season," as Lawes says, do much towards checking the undue stimulation of warm, moist weather.

Injuries constitute a most prolific source of functional disorder. They are of such a diversified nature that no general law is applicable to their treatment; it rather becomes necessary to deal, first of all, with the special agent by which the injury is produced, and afterwards with the injury itself. Disorders of this character arising through the agency of insects are not only oftentimes of a very grave nature, but they are sometimes difficult to deal with on account of the rapidity with which they may be distributed, thus becoming far-reaching in their action. In many cases a proper knowledge of the habits of the insect and its mode of development enables us to deal successfully with them. Their action as direct pathogenic agents, as in the production of galls and the destruction of foliage when feeding, is, perhaps, most readily controlled. It is indirectly through ovipositing and the subsequent action of the larvæ that insects often exert their greatest influence and become most difficult to control. As in the common borers, their action is usually very extended, and by operating upon the most highly vitalized tissues of the plant, serves not only to directly reduce the general system, but introduces conditions which rapidly promote decay, and thus is induced a diseased state which otherwise might not have obtained. In the scolytid

borer of the peach tree, however, we find a somewhat interesting relation of this insect to disease, since, so far as known, it oviposits in the bark of trunk and branches only when the tree has become diseased from other causes; and when other symptoms fail us it affords a clue to the pathological condition of the subject.

The influence of injuries extends much beyond the action of insects. In fact, it is through the infliction of injury that meteorological conditions sometimes exert their most lasting influence. The action of frost, especially upon those plants which have failed to fully ripen their structure, is a well-known and fruitful source of disorder. Man, likewise, frequently develops conditions which, if not properly controlled, serve as the open door through which disease may enter. The laceration of roots, improper pruning, the breaking of limbs, and a multitude of other injuries, either at the hand of man or arising from accidental causes incident to natural conditions of growth, all produce their well-defined influence. Nature, herself, invariably makes a strong recuperative effort in such cases, and oftentimes with success, but most generally some assistance at the hand of man is needed for complete results.

Parasitic plants, such as the mistletoe, act as pathogenic agents in a two-fold manner; first, by absorbing from and appropriating to themselves those assimilated materials which the host has provided for its own use; second, by the mechanical action which its growth within the tissues of the host necessarily exerts. The effect in this class of parasites is doubtless to be considered as strictly local, and the treatment becomes simple, since it involves the removal of the parasite with the affected part alone. It is thus not from this class that we may expect the most serious results, but rather from that much larger group of fungoid parasites, which, from their very diminutive size, our want of exact knowledge concerning the life history and mode of development of many of them, and the difficulty of obtaining precise knowledge concerning their mode of action, are not only exceedingly difficult to deal with, but must be numbered among the most far-reaching and destructive of all the influences which continue to promote disease. Indeed, it often seems as if the destructive energy of these organisms was developed inversely to their size and our knowledge concerning them. This class of organisms, as a whole, will be found to meet the best conditions for growth under the combined influence of excessive warmth and moisture, conditions which, as we have seen, directly promote debility and thus enable these parasites to secure a firmer hold. We have, further, to consider that these organisms occur everywhere, in the sick and in the well, on the living and the dead, but that they seem to particularly predominate whenever the vitality of the host is largely reduced, and especially when death occurs. The mere fact of association by no means establishes their pathogenic character to determine which it is essential that they be capable of inducing disease in a fully normal organism, rather than in one which has already become debilitated and diseased from other causes. If, also, we can restore a diseased structure to

its normal condition, and still find in the latter the same parasites which accompanied the former, we not only demonstrate that the action of the parasite can be controlled, but that it probably has no direct pathogenic value in that particular case. Such results have been obtained.* It therefore becomes a most important question to determine whether these organisms have a true pathogenic function, or if they are simply concomitants of disease. In general it may be considered that the growth of one organism upon another is at best a struggle for supremacy which must be decided in favor of that individual which is capable of bringing the greatest vital resources to bear upon its antagonist for the longest time, and there are many facts which would justify us in believing that the influence of these organisms is of a secondary rather than primary nature. At the same time, however, we must recognize that these parasites develop according to the same laws, and that their action is probably similar, whether in the plant or animal; and the various investigations concerning the relation which these organisms bear to animal pathology, offer, therefore, convenient means of examining their probable influence in the promotion of diseases in the plant.

In certain destructive diseases of the animal, it appears to have been well demonstrated that some of these organisms are most active and direct pathogenic agents, and yet it remains an open question as to whether the results are due to the physiological activity of the parasite in breaking down organic substance, or in the production of deleterious compounds which by first causing necrosis, permits the secondary influence of the plants in the promotion of disorganization to come into operation. As Sternberg expresses it,† "It is not alone by invading the blood or tissues that bacteria exhibit pathogenic power. Chemical products evolved during their vital activity, external to the body, or in abscesses or suppurating wounds, or in the alimentary canal, may doubtless be absorbed and exercise an injurious effect upon the animal economy. Indeed, we have experimental evidence that most potent poisons are produced during putrefactive decomposition of organic matter. The poisons resembling the vegetable alkaloids in their reactions, called ptomaines by Selmi, who first obtained them from a cadaver, are fatal to animals in extremely minute doses. These ptomaines have also been obtained by Gautier from putrid blood and from normal secretions of healthy persons—saliva, blood, etc." What is thus true in the animal may likewise obtain in the plant.

Whether they arise from the action of these parisites or from other causes, pathological conditions are doubtless to be regarded as developed in the vegetable kingdom in accordance with the same general laws which control them in the animal; the laws which primarily control life are the same in each case, and departures from them must result similarly. Diseases originate in disturbance of the protoplasmic functions, and through this involve the entire organism.

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*Diseases of Plants. Penhallow. Series III, No. 2, p. 36.

†Bacteria, p. 257.

During the period of active vegetation, the leaves and all other green parts of the plant assimilate carbon dioxide and water for the formation of starch, which is not only transported to other parts to meet the immediate requirements of growth, but a certain portion is deposited in the assimilating tissues themselves. Towards the close of the season, as the functions of the leaves gradually cease, no new starch is produced, and that already present finally undergoes complete transformation into oil. At the same time the color of the organ changes by a process of degradation in the chlorophyl. We thus have annually repeated both fatty degeneration and degradation of the chlorophyl pigment, as indicative of and incident to the normal animal maturity of parts. When from unusual conditions, however, these changes are caused to appear at any other than their normal period, they become sure indications of premature development through disordered function; so that when a peach leaf assumes a bright-yellow color in June, when it should be deepest green, we may feel certain, as is actually the case, that all its amylaceous cell contents have undergone fatty degeneration, and that it is an indication of disease which must be heeded. Similar changes are associated with pear blight, and doubtless with other diseases. The experimental evidence obtained by Dr. Cunningham,* not only demonstrates that such changes may be produced artificially by controlled starvation in both plant and animal, but they serve as a most interesting confirmation of the results obtained in a similar direction with reference to peach-yellows.

Atrophoid structures are always indicative of disease. They have been observed to occur in the experiments of Nobbe and Shroeder with buckwheat; they are also known to occur in peach-yellows, of which they constitute one of the characteristic symptoms of advanced development. Such depauperate growths are known to originate in imperfect nutrition of the growing parts, so that whenever present they give us a certain clew as to the general course of treatment to be followed.

From these considerations it is obvious that we can not hope to reach any correct diagnosis upon the basis of one or two external symptoms alone; we must in general go much beyond that, and have due regard for those which are internal as well. We now have to consider by what means a disease which originates locally may finally involve the entire system; by what general process it may be distributed through the organism.

In the case of fungoid parasites, it is not difficult to see that, with the rapid extension of the mycelial filaments through the organism and the very abundant development of spores, not only are conditions developed in the plant which favor the accelerated action of the parasite, but if the latter possess pathogenic power, disease arises constantly in new centers, and rapidly spreads through the whole structure. Owing largely to the physical obstacles opposed to the extension of the parasite, this, too, frequently fails to satisfactorily account for the very rapid diffusion of disorder throughout the system.

*Quarterly Journal Microscopical Science, January, 1880.

In the animal, the nutrient fluid of the body circulates through a definite system of channels, being distributed from a fixed center to which it afterwards returns from most intimate contact with the most remote parts. In its circulation it serves both as the medium through which nutriment is conveyed to the growing parts and effete matter is returned for expulsion from the system. It therefore serves as a most direct and favorable channel through which disease may be rapidly and effectively distributed to all parts of the body, and suggests a similar distribution in plants. But here analogy fails us. In the plant there is no definite system of channels through which the fluids flow and return, neither is there a fixed center of distribution As the food elements are absorbed from the soil, in watery solution, the crude sap passes upward through the various tissues, cells, and even cell-walls, in accordance with the law of osmosis, until it reaches the leaves, where, under the influence of light and chlorophyl, its chemical composition is changed, and it then passes to the various growing parts by the same physical laws of distribution. It therefore becomes obvious that anything of the nature of pathogenic germs could not be thus distributed on account of the physical obstacles opposed, and if disease does become distributed through the agency of the sap, it must be through abnormal chemical constitution of the latter, which directly affects and influences the various dependent physiological processes, and thus the disease becomes one of nutrition.

One other very important means of distribution requires examination. All the processes of growth, all the characteristics of the plant and its power to respond to external influences, are centered in the protoplasm to so high a degree that it alone, physiologically, is *the cell* upon which all else depends. Whatever operates to disturb the functional activity of the plant, must operate through its component cells; and the degree to which the organism is involved will depend upon the number of cells acted upon by the disturbing influence. But when there is an impenetrable cell-wall, and the disease is not one of nutrition, but arises from the action of some pathogenic germ, how may one cell succumb to the influence of those in its vicinity? During his examination of the endosperm cells of certain seeds, in 1881, Dr. Pangl determined the presence of a system of channels in the walls, through which a continuity of the protoplasmic masses in adjoining cells was established. About the same time, Strasburger, Fromman, and others, determined a similar continuity in other plants; and from that time on to the present a very large number of confirmatory facts have been obtained, especially by Gardiner, within the last two years. They are of such a nature as not only to establish the law of continuity of protoplasm, but render it highly probable that it is applicable to all living vegetable tissues;* so that, as Sachs expresses

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*Bot. Centralbl., XIV, 1883, pp. 89 and 121; Proc. R. Soc., XXXV, 1883, p. 163; *Ibid.*, XXXIV, 1882, p. 272; Quart. Jrl. Mic. Sc., Oct., 1882; Jahrb. Wiss. Bot., XII, 1880, p. 170.

it, "Every plant, however highly organized, is fundamentally a protoplasmic body, forming a connected whole, which, as it grows on, is externally clothed by a cell membrane, and internally traversed by innumerable transverse and longitudinal walls." We have in this, therefore, a most direct channel through which all parts of the plant are brought into the most active sympathy, and a means by which disease, from whatever cause it may arise, can be most rapidly and effectually distributed.

Last of all, we must direct brief attention to those general principles which should guide us in the treatment of disease, and it is hardly necessary to say that the first essential is to obtain a correct diagnosis, otherwise we may continue to grope hopelessly in the dark with only discouragement as a reward. As prevention is always cheaper and better than cure, let all the operations connected with pruning and transplanting be controlled by and executed in accordance with correct principles, bearing in mind that nature has established certain relations between the wood and the leaf, which, if disturbed, will operate against the health of the plant; also that a clean cut always heals most readily, while laceration introduces the elements of rapid disorganization.

As a preliminary in the treatment of any disease, I feel that the maintenance of full constitutional vigor is a point which can not be too fully insisted upon, as it is the one of all others which appears to be first overlooked. As shown, this may be accomplished by judicious feeding, with the application of such special elements of food as the case may require. Where this is done at the outset with due regard to the particular case, it will be possible to either effect a direct cure or so bring the disorder under control that other applications will be efficacious; for we must keep in mind what has long since come to be well recognized, that a vigorous constitution is the most solid basis on which to combat disease, and a natural remedy to which all the artificial applications of man are but aids. It would therefore be useless to continue the destruction of parasites by special treatment until such invigoration has been accomplished. The results would be of the most superficial and temporary nature, since the conditions, if not the actual cause, which favor the disease, are still present.

Special applications, such as strong lye or lime, which are designed to act directly upon the parasite, must be used with caution. Their value depends upon their ability to destroy the cellular structure and vitality, and it requires no very great degree of penetration to see that the action which is exerted upon the parasite must also be exerted upon the tissues of the host, and thus that which is designed as a benefit may and often does do as much harm as, if not more than, the parasite itself—since it strengthens and extends those very conditions favorable to disintegration and parasitic growth.

ON SOME OF NATURE'S METHODS OF SUBDUING INJURIOUS INSECTS.

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It is a frequent source of wonder why certain species of injurious insects occur during some seasons in immense swarms, causing much alarm and inflicting the greatest injury, while the next season, when one might reasonably expect, from their well-known fertility of reproduction, that their numbers would be vastly increased, they are found to be comparatively scarce. In this intermitting manner we have invasions of army worms, canker worms, span worms, tent caterpillars, grasshoppers, and a host of other injurious insects, which defoliate our trees and vines, consume our field and garden crops, and sometimes, when these destructive creatures cover large areas of territory, they induce much human privation and want.

It must be obvious to all who have given this question serious thought that up to the present time, whatever may have been the devices and inventions for trapping and destroying such insect hordes, any efforts which have been made by man for their destruction are comparatively insignificant, and utterly fail to account for the wonderful oscillations between scarcity and the greatest abundance in these several forms of insect life. To acquire any true insight into the causes which bring about these remarkable variations we must pry into nature's secrets, and, looking behind the scenes to which the view of the casual observer is limited, we shall find reasons for thankfulness, in that a wise Creator has so nicely balanced the contending hosts of insect life that when from any cause any one form obtains for a time a preponderance, that particular form is so preyed on by rapidly increasing hosts of insect enemies, aided by insectivorous birds, and sometimes by destructive diseases, that decimation soon occurs, and the unnatural increase is soon reduced within its natural proportions. The fecundity of insects is so great that were the natural checks or undue increase in any injurious species entirely removed, we should in most cases soon be compelled to abandon the cultivation of those plants which such insects select for their food.

We would not on any account be understood as belittling the agencies which man can bring to bear on certain destructive insects; on the contrary, we hold that the study and practical application of economic entomology is of the greatest importance in every agricultural and horticultural community, for, if we can by the use of judicious measures materially lessen the loss which these visitations always occasion, a great saving will be effected, far more than sufficient to compensate for the labor or expense incurred. More especially does this apply to fruit-growers, because their operations are conducted within comparatively limited areas, and hence they can often without much labor keep insect foes in subjection, which, if allowed to take their natural course, would entail severe loss. It is, however, none the less true, that where destructive insects of any sort have prevailed over large districts,

whether affecting fruit or field crops, their future, whether "to be, or not to be," has been left to be settled mainly by the controlling forces of nature.

Among the chief agencies employed by nature in subduing injurious insects are other species of insects, known generally as friendly insects. These insect friends may be divided into two classes, namely, predatory and parasitic species. Among the former we have what may be regarded as the carnivora among insects—the lions and tigers of the insectivorous world, who, fleet and powerful, roam about, "seeking whom they may devour." Foremost among these are the ground-beetles, or *Carabidæ*, a large family, consisting of many genera, embracing several hundreds of species, most of whom live largely or entirely on other insects. Some of the larger forms, such as the copper-spotted calosoma, *Calosoma calidum*, and the green caterpillar-hunter, *Calosoma scrutator*, are commonly known as caterpillar-hunters, for the reason that they usually pursue their useful avocation in open daylight, and, being of large size, their proceedings are easily observed. These species are quick in their movements, seizing their prey with relentless zeal, and devouring them with great rapidity. Another useful group is known under the name of tiger-beetles, *Cincindelidæ*, a race remarkably active in their movements, and possessing keen powers of vision, which enable them quickly to discover the objects of their search. The lady-birds also, *Coccinellidæ*, well deserve mention here, for they not only devour small insects, but also feed largely on the eggs of other insects. A large proportion of the useful insects thus far referred to devour other insects, both in the larval and perfect condition.

But man's insect friends are not confined to the beetle tribes. Among the *Hemiptera*, or true bugs, there are loyal and true species, which attack man's enemies with vigor, and suck their blood to the last drop. The observant eye will occasionally detect these creatures in their useful mission, with their extended spear-like proboscis thrust into the side of a caterpillar, quietly reducing it to a shriveled skin; or, if the larva attacked shows much activity, its squirming body is often hoisted aloft in mid-air, and there gradually emptied of its contents.

Friendly insects are also found among the *Neuroptera*. The larvæ of the lace-wing or golden-eyed flies, *Chrysopa*, are very active and useful creatures, and devour immense numbers of aphides. Their formidable jaws are tubular, and are furnished with a bulb-like base, by the alternate expansion and contraction of which the soft bodies of the insects they feed on are rapidly emptied of their contents. Some of the tiniest mites, which are scarcely visible to the unaided eye, also render us great service by feeding on the eggs of injurious insects. The egg-clusters of the tent caterpillar, *Clisiocampa Americana*, are very liable to be either partially or wholly destroyed by this means.

Among the *Hymenoptera*, or four-winged flies, man has many friendly helpers. Many species of wasps, which construct cells for their young to live in, store these cells with various insects, both in the larval and perfect

forms, and when a sufficient quantity of food has been thus provided to furnish a supply for a wasp during the period of its larval existence, a single egg is deposited, and the cell closed, usually with tempered clay or earth. Here the egg soon hatches, and the young larva begins to feed on the insect stores provided by its thoughtful parent, and by the time the contents of the cell are consumed the solitary grub has reached the end of its larval life, when it changes to a chrysalis within the cell, from which there soon escapes a mature wasp. One species is known to pack its cells chiefly with canker worms, and many others use injurious insects for this purpose. While multitudes of insects are consumed by these wasps, we are under far greater obligations to the ichneumon flies, which also belong to this order, *Hymenoptera*, for the friendly offices they perform.

These insects belong to the second, or parasitic class. They deposit their eggs either under or on the skin of the caterpillar they attack. In this class may be found insects of all sizes, from the tiny *Pteromalus puparum*, which preys on the cabbage worm, and is so small that it requires a keen sight to follow it in its movements, up to that large and powerful species, the long-tailed ophion, *Ophion macrurum*, which parasites and destroys the caterpillars of our very largest moths. Some time ago I had the opportunity of watching a female of the little parasite of the cabbage worm, while engaged in the work of depositing her eggs. She settled herself quietly down on the back of a caterpillar, towards the hinder end of its body, with her head towards the caterpillar's head, and paused awhile; then, with a sudden movement of her ovipositor, so quick that the motion almost escaped detection, she thrust an egg under the skin of her victim. The caterpillar seemed startled; its body quivered; and it jerked its head suddenly about as if it wondered what was the matter. The larva soon quieted, and the little tormentor sat perfectly composed on the spot where she first settled. Presently another thrust was made, followed again by uneasy movements of the caterpillar; and in this manner, in the course of a very few minutes, quite a number of eggs were deposited. The eggs so placed soon hatch into little grubs, which feed upon the fatty portions of the body of their victim, avoiding the vitals, and so injure it that it dies soon after it has entered the chrysalis state. The parasites complete their changes within the chrysalis of the butterfly, and escape through small holes made in the chrysalis. Some of the larger species deposit only one or two eggs in a single caterpillar; and as on account of the size of these insects they can not avoid being seen by the caterpillar, their movements are dexterously and quickly made. The ichneumon flies are among the most active of the insect hosts; they fly rapidly, and when alighted, run with considerable speed over the upper and under surfaces of the leaves of the plant, shrub, or tree, on which they settle, piercing eagerly with keen sight into every nook and corner in search of caterpillars. The habits of all the species in this group are very similar.

Another group of useful insects is found among the *Diptera* or two-winged flies, and are known as tachina flies. These deposit their eggs on the skin

of the caterpillars they attack, placing them in small groups, on the back a short distance behind the head, where they are firmly glued to the surface. The young larvæ when hatched pierce through the skin of the caterpillar and feed upon its substance in a manner similar to that of the ichneumon parasite.

Caterpillars are also subject to the attacks of contagious diseases, which sometimes carry them off by thousands. Those reared in confinement, such as silk-worms, are often decimated by these plagues, and those species which swarm on our trees and vines, and also in our fields, are also affected in a similar manner. These diseases are generally held to be of fungoid origin, and are communicated either by contact or by spores disseminated in the air. Large numbers of the forest tent caterpillar (*C. isiocampa sylvatica*) are often destroyed by this means. The larvæ are usually almost full grown before they are attacked; then, when the disease reaches a certain stage, they remain motionless, fully extended and retaining a firm hold on the trunks of trees, on fences, or any other material on which they have been crawling, and shortly, although they retain for a time a natural appearance, they will be found to be quite dead, and their bodies so softened as to burst with a very gentle handling. A species of cut-worm, *Agrotis fennica*, which has been very abundant and quite destructive to clover and other crops in some parts of Canada and in Michigan during the past year, has been so badly affected by the same disease that it has been difficult to rear any of them to perfection. Out of some fifty or sixty specimens collected by me for this purpose, nearly all were affected by this disease, and only one lived long enough to become a chrysalis, and this one did not mature the perfect insect. Even winged insects are not exempt from such diseases. The common house-fly is very subject to a fungoid disease in the autumn, the spores and filaments of which multiply with amazing rapidity in the fluids contained in the fly's body, and soon destroy life, forming a circle of luxurient growth all around the body of the victim. Examples of this may be found on the windows of almost every dwelling during the months of September and October.

The last agent we will mention as sometimes fatal to insect life, is a sudden frost. It is well known that the eggs of insects will remain uninjured through our most severe winters, but after hatching, if soon exposed to the depressing influences of frost, the young caterpillars die in great numbers.

Thus we see how parasitic enemies, fungoid diseases and climatic changes are so many controlling agents, used by a wise Creator to keep in check the undue increase of such insects, which by their wonderful fecundity would without them bid defiance to all man's efforts at repression, and cause the horticulturist to lament with the ancient prophet, "That which the palmer-worm hath left hath the locust eaten, and that which the locust hath left hath the canker-worm eaten, and that which the canker-worm hath left hath the caterpillar eaten."

THE HYBRID SIBERIAN APPLES OF AMERICA.

BY T. H. HOSKINS, M. D., OF VERMONT.

The first Siberian apples (or crabs) imported into this country were the varieties now universally known as the small Red and Yellow Siberians, which were introduced some fifty years ago, and planted chiefly for ornament, though often used for preserving. These are probably not the original type, and, unless the Currant crab described by Downing (F. and F. T. of America, p. 423) is the type form of *Pyrus baccata*, I know not if we have it at all. The term "crab" is very vaguely used. Properly, I think, it should be reserved for the wild species, though lexicographers do not so limit it. Among nursery-men and fruit-growers it is applied to many small culinary and cider apples of unrecorded origin, and of late the name is extended to a large number of improved seedlings, chiefly from the Siberians, many of which are believed to be, and a few of which are known to be, hybrids between the Siberians and our orchard forms of *Pyrus malus*.

Neither my own time, nor the brief limits desired for the papers to be read on this occasion, admit of an exhaustive treatment of my subject, and I shall limit myself to notes upon the best of those believed, or known to be, hybrids between *Pyrus baccata* and *Pyrus malus*, grown from seeds of the former. In fact I know of none produced by the reverse cross, though the variety called General Grant looks as though it might have had its origin in that way.

The crabs known as the Large Red and Large Yellow Siberians are, I feel sure, of pure Siberian stock, as they bear no marks, in tree or fruit, of being cross-bred. The earliest of the improved forms that attracted much attention were the Hyslop and Transcendant. While they each mark an advance, the first in size and the second in quality, they do not seem to me to bear signs of a cross with *P. malus*. The Hyslop, however, by the strong fragrance of its blossoms, indicates marked divergence, and may be a cross, or even a seedling, from the peculiar variety described by Downing as the Fragrant. Of this Fragrant I have no personal knowledge, and do not know which species it is to be referred to.

A strong rival to the Transcendant, among the earlier improved Siberians, is the variety described by Downing, and extensively distributed by American nursery-men, under the name of Montreal Beauty. This variety, together with another somewhat larger and quite distinct, was raised in Montreal from seed, some time between 1825 and 1830, by Robert Cleghorn, and in distributing scions the names became mixed. The true Montreal Beauty did not become popular, while the Montreal Waxen, or Cleghorn's Wax, took, by force of its pleasing appearance, the name of Montreal Beauty, which it still holds in most localities, though the same variety is called in Vermont the Queen's Choice.

When apple growing in Minnesota was at the lowest ebb of discourage-

ment (before the appearance of many Russians and the Wealthy), the growers, almost perforce, fell back upon the crabs, and large collections of seedlings of that class were made, particularly by the late Dr. Jewell, of Lake City. Among these were many meritorious sorts, superior in size. keeping and edible quality to such as were previously known. A considerable collection of improved seedling crabs was also made about the same time in Lower Canada, Northern Vermont and Northern New York. Illinois also contributed the Marengo crab, and from the Hudson river a single variety, the Van Wyck Sweet, appeared. From these lists a number of sorts have been accepted as of general or local value.

The Van Wyck is not strictly "iron-clad," but is large, handsome, and of very good quality, and the tree thrifty and productive. Beach's Sweet of Minnesota is nearly its equal, with a hardier tree. Meader's Winter is a fine crab for eating, canning and cider, the tree hardy, healthy and productive. Maiden's Blush, Quaker Beauty and Orange, of the Minnesota list, are good crabs, while Minnesota, largest of all, lacks only in productiveness. I do not hear that anywhere the Marengo crabs have sustained the claims made for them. With me only one of them, Lady Elgin, has proved valuable, but this is a very fine crab. From Northern New York Bailey's Crimson crab, stated to be a hybrid between Fameuse and a Siberian, is of the highest beauty and merit, but spots in some localities, like its maternal parent.

More recently Mr. Gideon, of Minnesota, has produced a line of crabs with fine characteristics of tree and fruit. From these I have selected Martha as the most desirable, being for all purposes of the first class, with the fruit large, highly colored and free from blemish, the tree strong and thrifty, free from blight and lavishly productive.

Whitney's No. 20, an Illinois crab, has gained and is gaining an immense popularity, combining all good qualities with larger size than most if not all the preceding. It does well in Vermont, and I hear no complant of it anywhere. Wisconsin has given us a fine list of hybrids, among which, judging from the show made of them at the last exhibition of the Montreal Horticultural Society, Mr. Peffer's Gibb must take a very high position for size, beauty and quality, while the tree seems to be among the best.

In Vermont one of our earlier productions among the hybrids is Pringle's Sweet. This variety, though not so good for eating as Van Wyck or Beach's Sweets, on account of a slight bitterness until "dead" ripe, is for size, beauty, productiveness and vigor of tree, the equal of either, and quite iron-clad. Baking destroys the objectionable defect in its flavor, and no apple is more desirable for cider making.

But undoubtedly Vermont's greatest success in this line has been Cady's Crab, or the Northfield Beauty. This rises to the dignity of an "apple," running in size considerably larger than Fameuse. The tree is productive, a vigorous and handsome grower, and though grown from a seed of the small yellow Siberian (supposed to be crossed by Hubbardston Nonesuch), has not much of the crab appearance. But the fruit, though so large, is an

unmistakable Siberian, by its brilliant colors, its polish, its slim, hard stem, and its prominent calyx. This fruit is of high excellence, approaching "best" in quality, and about with Wealthy in keeping. The tree is not strictly iron-clad, but is hardier than Red Astrachan or Fameuse. As a dessert fruit it is the best of all the crabs, in my opinion, and well worthy of cultivation anywhere that it will grow.

I shall conclude this sketch with a brief notice of a series of Vermont crab-hybrids produced some fourteen years since by C. G. Pringle, of Charlotte, Vt., whose botanical and horticultural labors are probably not unknown to most of the members of this Society. Pringle's Sweet, above mentioned, was a chance seedling in Mr. Pringle's orchard. When he intrusted it to me for propagation, in 1870, I urged him to work some crosses between our hardiest winter dessert apples and the longest keeping crabs. He complied with my request, and in the fall of 1883 sent me this series of nine kinds, produced from seed of the Transparent crab, crossed by pollen from the Wagner apple. They all show their relationship to the Wagner with remarkable distinctness, and are otherwise strikingly alike, although there is sufficient difference either in size, color, or quality, to distinguish them by. They run about with Whitney's No. 20 in size, some of them being decidedly larger, while I think none are smaller. The fruit was grown upon grafts made in the limbs of a large tree, and the seedlings were not preserved, so that, unfortunately, nothing can be said of the trees of any of them, as they have none of them been propagated.

Mr. Pringle's botanical engagements have kept him on the Pacific coast and among the Rocky Mountains for the past four or five years, so that he has given little or no attention to home affairs. I again last fall procured specimens of these crabs and have distributed the best of them among parties whom I thought would be interested in them. Had I thought of writing a paper for this meeting I would have saved some really good specimens, but as it is I can only send herewith some refuse fruit of a few numbers, which I submit to your consideration as among the latest contributions to this interesting class of apples, of which we need to know more, and which deserves a great deal more attention than it has yet received.

GROWING SMALL FRUITS AS A BUSINESS FOR WOMEN.

BY MATTHEW CRAWFORD, OF OHIO.

It seems to be according to the order of nature that man should face the world boldly and bravely, rather seeking than avoiding its bustle and competition, but that woman should be defended from the rough experiences of life by the stronger arm of a husband, father, brother, or son. Were she always thus happily situated there would be no necessity for planning what woman can do. Not that she should lead a useless life—no person who is

able to work has a right to be idle; but when woman keeps the home, and attends faithfully to the demands of those vocations which are suited to her, she does her fair share of the world's work. We all know, however, that even in this favored land very many women are dependent upon their own exertions for a living; and not only this, but many, besides caring for themselves, have others looking to them for support. How to provide for these is a serious question.

There are many remunerative occupations which are closed to woman by reason of her want of physical strength. She can not well engage in agriculture. There is so much heavy work connected with it which she can not do herself, and if she attempts to hire it done the proceeds will often fail to pay the help. Market gardening is open to the same objection, and both have the added drawback of requiring too much capital.

She can not find employment as a common laborer. Aside from the barrier of lack of strength, she could not engage in such an occupation without losing much that makes her womanly, and being reduced to the level of a beast of burden. This can not be done in the United States without a radical revolution in public sentiment.

She can not learn the mechanical trades, nor engage in mining, or lumbering, or railroading.

When she turns her attention to the lighter avocations the case is but little better; for though she may get a situation as clerk in a store, or operator in a telegraph office, or other similar position, she must be content with half pay. She may have all needed ability, perfect integrity, and a determination to render good service, but she must do for five dollars a week that for which a young man—too effeminate and genteel to work, too ignorant to enter a profession, and too poor to engage in business on his own account—will receive ten or more. We have an opinion of these ambitious young men who aspire to measuring tape, dressmaking, or any other light work that a woman could easily do.

When the professions are considered as a means of livelihood, woman is virtually shut out. A very few of her sex have studied law, and been admitted to the bar, and a few have entered the ministry. Some have studied medicine, and are doing noble work in their chosen profession. Still, the number who can engage in the law, the ministry, or the practice of medicine, is so very small that the professions seem hardly worth counting as avocations upon which women can depend.

It is conceded on all hands that women are naturally adapted to the work of teaching, and the number of those who take it up is rapidly increasing; but here again they are subject to the galling injustice of seeing men receive much higher pay for the same work. Even the principal of the high school in so large and enlightened a city as Cleveland, Ohio, asserts that men should receive better salaries than women for teaching, because they will not work for the same. They demand more, therefore they should receive more!

We hear much about the avenues that are open to women at the present day; but, look at the subject as we may, they have not an equal chance with men. Besides being shut out of many occupations by physical incapacity, and working for inferior pay in many of those in which by superior fitness and faithfulness they have gained a foothold, they find themselves elbowed by men, even in those vocations which belong especially to them, as, for instance, millinery and dressmaking.

But there is a pursuit in which very few women are as yet engaged, which offers more advantages, with fewer drawbacks, than any other to which she can turn her attention. This is the cultivation of small fruits. The leading characteristics of this work are such as to recommend it especially to women.

It is not laborious, does not require great physical strength, and yet it furnishes proper and plentiful exercise for both mind and body. There is but little heavy work connected with it, and that little can be hired. It does not require much capital. But little land is required, and no expensive implements. When the business is begun in a small way, and gradually increased, there is scarcely any expense worth naming.

Fruit growers meet with less competition than almost any other class, and next to none from coarse or ignorant people. Their products generally meet with a ready sale. And here, for once, woman has an equal chance with man; when she sends fruit to market no one demands it for half price because it was grown by a woman.

Fine fruit sells on its own merits; and while it has no fixed value, like wheat, a good article is always in demand at a paying price. No advertising is needed to sell it, and no money is spent in building up a trade. It can be grown in any part of the country, and there is a market for it wherever people live. The demand for fruit is not based simply upon its being delicious and attractive—it is a real need. The human system has a natural appetite for the combination of acids and sugar that is found in berries.

When we think of the thousands and millions of people who live in cities and raise nothing, we partially realize the extent of the demand for fruits, and the conclusion is that for a long time to come the demand will exceed the supply. True, the market is sometimes overstocked for a day or two, but in such a case the producer can dry or can the surplus. The market for dried fruit is never overstocked.

Small-fruit growers have another advantage in the fact that their products come into market in the summer, when people have money and are liberal in spending it, rather than in the winter, when many are idle, and when those who have employment find that the necessaries of life make such heavy demands upon their earnings that they have little left for luxuries.

The advantage of being one's own employer is worth much. No one can fully appreciate this until he has been subject to the call of a bell or a whistle. There is not a single qualification needed for the business of growing small fruits that woman does not possess. Indeed, a much larger proportion of women than of men are suited to the work. Farmers in general will let

their families go without fruit rather than to raise it, but farmers' wives are interested in horticulture. They raise the flowers, and often the vegetables. They attend to details. They are in sympathy with their pets, and learn their habits much sooner than men do. As a rule, they are not so apt to neglect their work as men are. Added to this, they have a "knack" which gives them success. A skillful gardener once said that a woman with a cracked teapot could root cuttings that an experienced propagator with all his modern appliances would fail with. It is not hard work, nor the ability to do hard work, that makes fruit-growing successful: it is the heart-work, the real interest, the carefulness and faithfulness and good judgment that are put into the enterprise.

Lack of knowledge is no obstacle, for this can be acquired easily and quickly. There are no secrets in fruit-growing. Those engaged in it are always ready to communicate their knowledge, and every horticultural society is engaged in disseminating information.

HINTS TO BEGINNERS.

First, post up on the work. Study your facilities, your land, capital, nearness to market, and ability to obtain needed help.

Secure the control of some good land. It costs as much to prepare and cultivate poor land as rich, and the profits are little or nothing.

Begin in a small way. You will make some mistakes, and will have much to learn. If you do everything well, and at the right time, you can not attend to much at first.

Plant but few varieties, and only such as generally succeed, You can well afford to do without those new kinds that are "destined to supersede all others."

Be more practical than theoretical.

Be more ready to believe what you see than what you hear.

Take some good horticultural papers, and read them attentively.

Join a horticultural society if there is one within your reach.

Do your work well. Both profit and satisfaction come from a little well done, rather than a large plantation grown in a slipshod manner.

Sell no poor berries. They will injure your credit more than they are worth. Use them, or give them to those who have none and can not afford to buy.

Keep your plants growing during the growing season. Injure no roots in cultivating. Plants make their own repairs, but they should be better employed. The force expended in healing a broken root might be more profitably used in building up the plant or storing away nourishment for the next crop of fruit.

All the berry plants do best on land that is rich, moist (not wet) and cool. Without richness, there is nothing to make fruit of. Without moisture to dissolve the food in the soil, it is unavailable, for all plant food is taken up in solution. Without a comparatively cool soil, the plants can not remain

healthy. Each plant should have plenty of room, and no other roots should be allowed to rob it of food or moisture. The surface of the soil must be kept loose by stirring or mulching, so as to admit air to the roots, for they can not live without it. As a plant can make its wants known only by signs, he who best understands these signs, and is most faithful in supplying the wants expressed by them, will succeed best.

The fruit-grower is an employer, and each plant set out is an employe which can accomplish much or little, according to the master's knowledge of its needs, and his faithfulness in providing for them. Each plant set out is an independent establishment, and if not hindered will go steadily on doing the work appointed to it by nature—gathering its food and changing the raw material, by means of rain and sunshine and the atmosphere, into delicious fruit. It is a pleasant thought that the plants which we set out and care for are so many little helpers engaged in our service; and whether we sleep or wake, are sick or well, they still go on with their silent, busy work.

It is the fruit-grower's province to see that all the conditions are favorable, so that there may be no interruption of this work. His returns will be in exact proportion to his judgment and thoroughness in this respect. This is a point where knowledge is power.

NEW STRAWBERRIES.

BY A. D. WEBB, OF KENTUCKY.

A brief report on a few of the new strawberries that fruited on my grounds the past season, from spring set plants only: This test is nearly an index to the future as to fruit, while it is a pretty fair test as to plant. Without a good, healthy, vigorous plant not much desirable fruit can be expected. Yet, not all good plants are good croppers. Some of the best plants I ever had were comparatively worthless for fruit. The past season proved very unfavorable for both plant and fruit in my locality. Notwithstanding the unfavorable season, the few varieties that I propose to report on proved quite satisfactory both in plant and fruit.

JERSEY QUEEN—This, so far, has proved to be a No. 1 plant, passing through our dry and heated term without spot or blemish; fruit large and of fine quality. I think this variety better adapted to the family garden than for market—its light color is objectionable as a desirable market berry and too soft for shipping. Taking plant and fruit together I regard this the best of Mr. Durand's seedlings that I have fruited, having tested quite a number.

JUMBO—The big elephant, or latest of all, recently introduced by A. M. Purdy. In plant and fruit it is so much like Cumberland Triumph that I could detect no difference—I had Cumberland within two feet of it. As I

fruited this in a limited way, I won't say it is or is not Cumberland, until after fruiting it another season. I think Mr. Purdy is certainly too old in years and experience, and occupying the position he does, has too much at stake, to knowingly introduce an old strawberry under a new name. If the Jumbo should prove distinct from the Cumberland and superior to it in any one particular, I will prize it very highly, the Cumberland being one of my favorites for family use and a near market.

ATLANTIC—From the bogs of New Jersey. This is also a good plant, though not quite equal to the two former in vigor. Fruit good size, good color, good quality, and, so far as tested, I think sufficiently firm to carry well, even long distances. I have strong hopes of this proving an acquisition to our short list of good shippers.

CORNELIA—Originated by M. Crawford, of Ohio, and claimed by him to be a very desirable late variety. So far as tested it has fully met my expectations; plant resembling Atlantic very much, with a marked difference in fruit. Fruit may be classed as large and very uniform; quality fair. As to its lateness, I can only say it proved later than any of my spring setting, Jumbo not excepted. If Mr. Crawford had given it one more dip and brought the color out a little brighter, this would have been an improvement.

Another season may possibly change my opinion of some or all these varieties.

FOREST TREE PLANTING ON THE PRAIRIES OF THE NORTHWEST.

BY HON. GEORGE H. WRIGHT, OF IOWA.

In presenting the subject of forest tree planting on the prairies of the Northwest, there are several important questions that present themselves to the practical operator, and that we may fully understand the subject, we name the following for present discussion: Latitude, longitude, altitude, annual rainfall, season of the year of the greatest amount of rainfall, kind of soil, and from what points of the compass are the prevailing winds during the growing season.

The planter of experience will consider all of these important factors before he fully determines the mode of planting and the varieties of trees to be used. When we consider the great variety of soils and different degrees of fertility of the soil, the main distinctions are in altitude, the amount of rainfall in some parts of the prairie regions as compared with other localities, the general humidity of the atmosphere, the dry, hot, scorching winds that prevail in summer and the arctic cold of winter—the rainfall varying from ten inches per annum in some portions of this vast territory to sixty inches in others—it is then we begin to secure a ray of light upon the subject.

With these preliminary remarks, we pass on to the subject of preparation of the ground for the work in hand. Break the ground in the latter part of May or June, but not later than July 10; plant the breaking the following year to wheat or flax. After harvesting the crop of grain in the fall plow the ground deep and thorough; pulverize well with harrow. If the ground has been well broken and cropped and the cross plowing well done, the ground is now in as good a condition for planting as is necessary; if not, plant the ground to grain one year more.

Presuming the ground to be under as good cultivation as is desired, we are now ready to plant our one year old seedlings or seed, as the case may be. Let us for a moment consider the subject of seeds, which we may divide into three parts, viz., nuts, hard seeds and soft seeds. The nuts should be planted where they are to grow, as the trees grown from nut species do not usually transplant well, commonly having a long tap root. All nut seeds should be planted in the fall, as soon after they are ripe as possible. Great care should be exercised not to allow nuts to get dry before planting. The same caution should be observed to prevent them heating or molding. Thin-shelled nuts dry very soon, even in a few hours. Should the circumstances be such that it is not convenient to plant the nuts in the fall, they can be successfully wintered by placing them on the ground in the shade of buildings, fences, or a temporary shelter may be made to keep them from the sun's rays during the winter. Spread them out in thin layers with earth or sand thoroughly mixed among them, and the whole covered with coarse litter of leaves or hay. Care should be taken to prevent their freezing up dry. This may be avoided by pouring on a sufficient amount of water just before freezing up.

Hard seeds are slow to germinate and should be soaked a long time, frozen wet or scalded before planting, or to be subjected to some action to hasten germination. This class embraces honey-locust, osage orange, coffee beans, etc. The soft seeds, comprising soft and hard maple, box elder, elms, green and black ash, white ash, basswood, sycamore, etc., some of which seeds ripen in May, while others ripen in the fall. The best treatment of these seeds is to plant them as soon as ripe, in nursery rows, about an inch deep, rolling the ground as soon as planted.

I would advise planting all soft seeds in seed-beds or nursery rows and cultivate for one year, then transplant at one year of age. In planting, my custom has been to mark the ground, after plowing, harrowing, etc., with a marker made as if for marking ground for corn planting; the rows are to be four feet apart. Cross the first rows at right angles with the marker and plant in the corners, thus placing the trees four feet apart each way, making a little over 2,700 trees to the acre.

The best and at the same time the most expeditious way to plant one year old deciduous trees, is to place a spade in the corners of the marks perpendicularly, placing the foot on the spade and pressing the spade into the ground the whole length of the blade; then push the spade from you and

turn it to the right at the same time. This process leaves a hole back of the spade large enough to receive the roots. Have the second man carry a sufficient number of trees for a given distance, accompany you, and as the spade is removed from the hole, the man carrying the trees places one in the hole, two or three inches deeper than it grew in the nursery, holding the tree in his hand until you press the dirt solid around the roots with your foot.

Follow up this method until the entire planting is completed. Two men with a spade will plant in first-class condition four thousand trees per day.

I have tried other methods but found this the best and cheapest.

We have now reached the place in our work where we must make the selection of the varieties of trees we would plant, and as I said in the beginning of this paper, this must depend upon the locality, climate and humidity of the atmosphere, etc.

In a paper of this kind we must of necessity be brief, hence many very important matters of detail must be left to the good judgment of the planters.

I will divide the territory into three general divisions, all north of the 46° parallel and west of the Red river for general planting. I would plant in the order named the following: Box Elder, Western White or Green Ash, English Gray Willow, Yellow Cottonwood, Hackberry, Wild Black Cherry; and as far west as the James or Dakota river: European Larch. From the 46° to 42°, all of the above, with Soft Maple, Hard Maple, Red and White Elm, Sycamore, Linden, Red, White and Bur Oak, Black and White Walnut, and Honey Locust; and for east half of Minnesota and Iowa add Scotch, Austrian and White Pines and Red Cedar, also Canoe Birch.

South of 42° to 38°, in addition to above, Hardy Catalpa, Ailanthus and Shellbark Hickory.

There is no tree that will pay a better margin than Black Walnut planted on deep, rich bottom land, four feet apart each way and south of 41st parallel. The hardy or Western Catalpa for all soils is eminently the tree for all purposes.

South of the 40th parallel we would drop out the European Larch.

The Box Elder has some very valuable qualities. I have found it grown in Manitoba, as far north as 52°, where the annual rain-fall is less than ten inches, and where the thermometer goes down to —45°. I have also found it growing and in a healthy condition at Monterey, Mexico, where it is so dry that grain and vegetables will not mature without a system of irrigation. The trees of this variety I saw in Mexico were four hundred feet above the San Jean river. Any tree that will thrive and flourish at such great extremes is worthy of trial by the arboriculturist before he condemns it as worthless.

FRUIT EVAPORATION—THE HANDMAID OF HORTICULTURE.

BY DR. J. F. SIMONDS, OF ARKANSAS.

The fruit and vegetable grower, like the producer of nearly all other farm crops, or, like the worker in mines, who brings to the surface the hidden treasures of earth, has done but part of the needed labor to prepare and utilize for the sustenence or wealth of mankind the products of his industry. Though a larger proportion of the value of fruits can be converted directly to the use of man without manufacture or preparation than that of any other product of his labor, it is equally true that they are the most perishable of all his wealth, and require additional labor in manufacture to save them from loss or preserve from decay.

While grains, grasses and minerals are comparatively or entirely exempt from waste, it has been estimated that one-third of all fruits and vegetables produced are lost by decay, and it is, as a process of preserving fruits for food, adding to the safety and economy of their production, that evaporation becomes the handmaid of horticulture.

The census of 1880 values the orchard products of the United States in 1879 at $50,876,154; market garden products, $21,761,250; Irish and sweet potatoes at 202,837,232 bushels, which, at an average of fifty cents a bushel, would be $101,418,616, or a total of $174,056,020, representing in truth but two-thirds of the actual product of that year, leaving the enormous waste of $87,028,010, which, by true evaporation, can be and ought to be saved to the wealth of the country and the comfort and sustenence of its population.

While the horticulturist produces many of the most valuable and wholesome articles of food, containing in rare combination the nutritious elements with extractive substances, aromatic principles and vegetable acids, which serve as tonics and antiseptics, correcting the putrefactive tendencies of nitrogenous food, averting scurvy and strengthening digestion, they are at the same time, from the nature of their composition, the most perishable products of his industry, and he is next annoyed by the untimely waste of fruits which for months have claimed his labor and his care.

It is now that the evaporator steps in, and by the application of the natural laws which govern heat and evaporation, and a few of the simpler chemical combinations, he rescues from decay the otherwise perishable products of man's labor and saves them as food-wealth for the comfo t and sustenance of thousands.

Fruit drying is coeval with fruit growth. The fig and grape, together with the historic apple, were undoubtedly the first products of Adamic horticulture, while Mother Eve, with the industry and thrift of a frugal housewife, which traits have so fortunately been perpetuated even unto this generation as striking characteristics of all her sex, no doubt dried the fruit as our own mothers since have done.

The perishable and transient character of fruits has naturally led to the study of the conditions which operate in producing their decay and a search after methods for their preservation. Heating animal and vegetable substances, and excluding them from the air, or canning, as it is called, was first practiced by the French chemist Appert, in France, in 1809, and various other plans for preserving fruit by drying in ovens and kilns and furnaces have been practiced for many years, but *true* evaporation of fruits and vegetables, and as we now understand it, was first practiced in the United States, and has been developed within a very few years from the simple experiment with a few bushels to an industry of immense proportion in all the fruit growing States, with large capital invested in machinery and buildings, utilizing the fruits formerly wasted, and encouraging the grower with increased profit to an increased production by rendering the crops of the orchardist and gardener as safe from the hazard of deterioration and decay as cotton and grain, or hemp and wool.

The manufactured orchard products are worth more pound for pound than any other farm staple except cotton and wool; each pound of evaporated fruit representing upon an average eight pounds in the green or fresh state, and a single factory of to-day can, during the working season, more than supply the total amount which was exported ten years ago.

The importance and economy of any process which will quickly and safely preserve the products of our orchards and gardens can hardly be calculated, as the necessity for disposing of all fruits and vegetables as soon as ripe greatly diminishes the profits of the grower by forcing all engaged in the same business to sell at the same time.

Now, by what means and in what manner are the important processes and results which I have indicated to be accomplished?

How does evaporated fruit differ in quality and value from sun-dried?

These questions strike to the bottom of the whole operation, and involve not only all the philosophy and chemistry of the process, but the dollars and cents, which interest us perhaps more than the science of the business, and may perhaps be answered best by considering briefly the composition of fruit in its fresh state. All fruits have an inherent aptitude or liability to change and decay, arising from the fact that they contain elements which are very changeable and susceptible to decomposition, among which are some that are the most valuable and nutritious of the substances designed for food.

About 85 per cent. of most fruits is water, without which none of the chemical changes which occur in the process of decay can take place, and hence the first step is to get rid of it or evaporate it. This is accomplished by heat, and the manner in which it is applied will determine in a great measure the quality and value of the product.

In the process of sun-drying the fresh cut surface of the fruit begins to grow dark immediately, or to rust by the action of the surrounding air, and as the water slowly evaporates the process of oxidation continues and goes deeper and deeper, until the whole cellular tissue is involved, and has become

harder and tougher, and more indigestible, while the sugar, starch, albumen and gluten undergo a slow process of ferment and decomposition.

. None of the starch in the fruit is converted into sugar, as it should be, and the sugar already existing is, by slow vinous and acetic fermentation, ultimately converted into vinegar, so that a sun-dried apple is little else than a spongy piece of hardened cellular tissue filled with dried starch, rotten albumen and gluten, combined with vinegar, all seasoned with dust, fly specks and dried insects.

The changes which take place and the product are the same in all slow processes of drying, either in the sun or kilns, or in some so-called evaporators, except that the dark color, fermentation and souring, which take place in the sun-dried fruit during the drying, occurs afterwards in that dried in ovens and kilns or slow evaporators

I will now describe what I call *true evaporation.* It has been found that by drying fruit rapidly in swift currents of air heated from two hundred to two hundred and forty degrees Fahr. a different product is the result, wholly unlike either the fresh or sun-dried fruit, and which will keep better, is more digestible and nutritious, is less acid, and will sell for more in the market.

But if, after having heated the air hot enough, there is not sufficient circulation, or the currents are not rapid enough, the fruit will cook and then dry or burn, the same as in a close oven.

Apples will cook in boiling water at a temperature of only two hundred and twelve degrees Fahr., or bake in an oven at two hundred and twenty-five degrees Fahr., but if the heated air circulates fast enough the fruit will not cook or burn or become heated to the temperature of the air which surrounds it, for the evaporation of the water is a cooling process, and every particle of vapor leaving the minute cells which contained it carries away a large amount of caloric in a latent form, and thus keeps the heat of the fruit far below the surrounding air.

It is now that the chemical changes belonging to the truly evaporated fruit take place, and the albumen, instead of being slowly dried, is coagulated precisely as in an egg when boiled.

The soluble starch existing in all fruit, composed of $C_6 H_{10} O_5$ will, if the heat is high enough, combine with one equivalent of water ($H_2 O$), so that now we have an entirely different compound, to wit, glucose or fruit sugar, which will assist in the preservation of the fruit, instead of being liable to decomposition as the dried starch is in the sun-dried and other slow heat products. All the pectine or fruit jelly remains in the cells undecomposed, or is left upon the surface by the evaporation of the water in which it was dissolved, where it may be often seen condensed, instead of passing on with the starch and gluten and glucose into the alcoholic and acetic and finally into the putrefactive fermentation.

The diastase or saccharine ferment contained in all fruit, and which is the exciting cause of decay, has been rendered inoperative, and all germs of animal or vegetable life have been destroyed by the high heat.

In most processes of manufacture, the principal objects sought are to give greater stability, or lessen the liability to change in the product; or, by new chemical combinations, to produce a new and more valuable article, and so it is by the chemical change which I have described when the water and fruit-starch unite in *true* evaporation to produce another and more valuable compound, not only as an article of food, but one less liable to decomposition and waste.

And this is also the reason why a bushel of apples will make more pounds of evaporated fruit than can be made by sun-drying it—precisely as a loaf of bread weighs more than the flour of which it was made by combining and retaining a portion of the water or other fluids used in mixing—and it also explains, what seems so strange to housekeepers, that evaporated fruit does not require as much sugar in cooking it as that which is green or sun-dried. All the changes wrought in the fruit by *true* evaporation are in exact accordance with the laws of nature, and are certain to take place if the necessary conditions are properly supplied.

They are wholesome changes, as they destroy the natural ferment of the fruit, preserve the albumen, gluten and other perishable constituents in a digestible and nutritious form and are valuable, as they result in an increased weight of product over sun-drying and in a more permanent and valuable form.

If the proper amount of heat and air are not supplied, and in the right manner, you will have a different product. No matter how fine your apples, how perfect the paring, coring and trimming, or how white you may have bleached them, *you have not made truly evaporated fruit*, and no matter how many have been deceived by its bright color, full weight and fancy packing, your fruit *will not stand the test* of long keeping in warm, damp weather.

If the diastase has not been destroyed by sufficient heat, but retains its vitality, and the starch has not been transformed into grape sugar, but has been merely *dried* down with the albumen and gluten, the work of decomposition and destruction is liable to begin whenever the conditions of warmth and moisture are supplied, and the fruit will absorb moisture, will soften, and swell or increase in bulk, get moldy and sour, and finally decay.

The bright, light color of good evaporated fruit is produced by the fumes of burning sulphur, which was once used for the sole purpose of bleaching it, but its greatest benefit when properly used is to assist in the conversion of the soluable starch in the fruit into grape sugar. The sulphur fumes (SO_2) are absorbed by the moisture upon the surface of the fruit, and then we have sulphurous acid ($H_2 SO_3$), which, as it comes in conract with the starch at a heat of from 190° to 200° Fahr., by its presence only aids to convert it into grape sugar or glucose, as I have before stated. All these changes are controlled by natural laws, which are as definite and unvarying as any other law of nature, and no wisdom or ingenuity of man can change them.

In speaking of evaporation as now understood, I have only outlined the principal features which distinguish it from sun-drying or in slow kilns, and

how it becomes a direct aid to the horticulturist in saving his otherwise perishable products and wasted labor, encouraging him to renewed industry by the stimulus of an increased profit rescued from the waste which he has formerly suffered and could not prevent.

The details of the process and the claims made for any of the machines or apparatus of different patentees or manufacturers employed in the art, this is not the proper place or time to set forth, and I will only give a few of the main points to serve as guides or axioms to such as may hereafter embark in the business, or to such as have not succeeded in producing the quantity or quality which their interest and their ambition may have led them to hope for.

First. Heat sufficient to coagulate the albumen and to destroy the diastase or saccharine ferment of the fruit, thus giving increased value to the product by removing or destroying its inherent tendency to change or decay.

Second. Enough heat to assist in changing starch to grape sugar and continued long enough to evaporate the surplus water not required in the change.

Third. Sufficiently rapid circulation of air to prevent cooking or scorching of the fruit at the temperature required to produce the necessary chemical changes, and to carry off the surplus moisture before it is deposited again in other fruit in cooler parts of the evaporator.

If your evaporated fruit is too dark colored, or too white; if it is too dry and brittle, or too damp and slippery; if it becomes sour and moldy, and does not keep well in damp, warm weather, and if the weight of the product is not from one to four pounds greater than can be obtained from the same fruit by sun-drying, you may be very certain that you have not supplied the proper conditions in a proper manner, and the fault may lie in the machinery you use, or in wrong management of the best evaporators that are made.

With a proper understanding of all the requisite conditions and a thorough belief that *drying is not true evaporation* very few will fail of success, and without such an understanding no one had better begin until he has acquired at least the rudiments of the trade.

CELERY GROWING FOR THE AMATEUR.

BY RUFUS W. SMITH, OF NEW JERSEY.

We are all aware that there are many who after attempting unsuccessfully the culture of this most esculent vegetable have afterward given it up, considering it too delicate a plant to thrive with them. This error, I think, is often owing to only partially comprehending the nature and requirements of celery, as it is a hardy, vigorous plant when grown understandingly. Celery, we learn, is found growing in a native state in different parts of the

world, and always in wet, cool places—along and in streams and ditches—therefore nature teaches us that to make celery thrive best we must avoid, as far as possible, a droughty soil and hot suns.

We go back to the seed bed where the gardener has so often met with failure, and keeping nature by our side, try again. Let's see. The bed was four by six feet, rich and mellow, seed sown shallow the middle of April—we will sow it a scant half an inch in depth, in rows six inches apart, and firm the ground with a garden roller or board. Now then for nature; we will keep the bed moist and cool by giving it a slight covering of fine straw, just so the ground can be barely seen, and we will never let the ground dry out beneath; if rains are not sufficiently frequent we will use the watering-pot. In ten days to two weeks we may, with certainty, look for the green rows. We begin to scratch the straw off and see that the supply of moisture is kept up without remission, and ground kept mellow between the rows. When the plants have attained a height of one or two inches we thin them out so that they stand an inch apart in the row. Nine-tenths of our readers will not have the courage to thin thus, but then we know they will constitute the vast majority who will not have the vigorous success-insuring plants which we shall possess.

As the hot and drying days of July approach every other evening finds us with six gallons of water which we sprinkle evenly over the bed. A few days of neglect now would be very injurious and probably ruin our plants. At this time, if our plants have grown over eight inches in height, we cut them back to two or three inches. About the 15th of July we find ourselves in possession of six hundred strong and stocky plants; three hundred of these will be sufficient for a large family, and we easily dispose of the remaining three hundred at fifty cents per hundred, which will repay us for our seed and the water we have carried. We begin to see now why we could not succeed by the old method; the seed, of necessity, was sown very shallow, the ground had been dried out once or twice to the depth of the seed while it was trying to germinate; the surface had become slightly crusted, and being out of its natural moist element the seed mostly perished; what few did get through and live were burned out the last of June by hot suns and lack of moisture. The latter part of July we transplant. The farmer often finds this difficult, and if the plants are weakly and have been "pulled," they are unable to survive the ordeal of transplanting in a dry time. *Celery loves coolness and must have moisture*, but robbed of its fibrous feeding roots and transplanted in midsummer, with the cabbage, it is liable to get neither, hence his lack of success. We will try to do a little differently and interfere with nature as little as possible. To begin with, we shall have better plants and, instead of pulling, we will lift them, thus securing many of the fibrous roots within the lump of earth which we are careful to raise with them. We have got our ground rich and fine, and have scooped out a trench an inch or two in depth; toward night we take a shallow box and our garden trowel, and, after wetting the bed thoroughly, we begin to dig plants. What, ho? Gra-

cious, what roots—a long tap root just loaded with side roots. Truly, there are three of roots to one of top. Ha! this fellow must be a gross feeder. I will lay it in some mud and deepen and enrich my soil more. Four quarts of fine bone dust, also stirred into the soil will certainly be a benefit. Now we will again begin to dig plants. I fill my box and transplant, being careful to leave them the same depth they stood before, and six or seven inches apart in the row, and return again and again until the plants are all "moved." Now we will get the conditions like unto nature quickly. We pack a little straw each side of the row—one hundred and fifty feet—and give them a thorough drenching. If weather is not cloudy and moist we lay some slats across the row, upon which we lay a row, six inches wide, of boards, slabs, anything that will keep the burning sun off the plants from 10 A. M. till 3 P. M. We will remove this as soon as the plants have made a good start to grow—usually when the midsummer rains, which almost invariably come the last of July and keeps showery for a week or ten days.

And now do you know the battle is nearly won. If we have transplanted where the supply of moisture can be continually kept up, we may expect such great hearted, heavy bunches, with stout, crisp and tender stalks as are seldom seen off the exhibition table. We must keep the ground well tilled until the first of September, or until the plants have grown quite strongly, when we give those we wish for early use the first handling. This is done by making the soil mellow each side, and then with a hoe in the right hand, grasp the plant with the left, holding the stalks closely together, pull the earth up around the plant six to eight inches. This should be done late enough in the day so that the plant is free from dew, to prevent rusting. For winter use we defer handling until October 1st. As the season advances keep on hilling up until the middle of November, when nothing but the green tips are visible. In this condition celery will stand a heavy frost without damage; but as low temperatures may now be expected at any time, which might cause ruin, it is best to remove to winter quarters, and the following method I have found to be as convenient as any for family purposes: I dig a trench ten or twelve inches in width, the depth to be the height of my plants, less six inches, and make the sides perpendicular. In this I pack my celery closely and in an upright position, being careful to leave a lump of earth the size of a cocoanut adhering to each root. I stake a six-inch board each side, and earth up even to top of board. At first I cover lightly with burlaps or old carpet, as there may be slight danger of heating the first ten days. As the cold increases, I add to the covering until I have it frost-proof. It is very sensitive to frost after it has become blanched. A trench twenty feet in length will hold two hundred large plants. No extra earth should be packed with the celery, as the lump adhering to the root and being packed closely in the trench, there is always sufficient moisture present.

This year I blanched my early celery by tying it up with stiff brown paper. This I find to be an improvement upon earthing up, as it is less trouble, prevents rust, and one can water better if drought prevails.

The more nearly we have our celery blanched at storing, the shorter time will it keep. So the hundred plants we wished for use in February and March we did not hill up in October, but took a newspaper sheet and folded it into a band eighteen inches in length and six inches wide, wrapped around loosely and tied. This forced it to grow upright. Fearing freezing weather before ready to store, I pulled the bands up around the tops and threw earth against the sides. After storing away I threw the covering off the trench every fair day, admitting sun and air, which also helped to retard blanching.

I have my celery convenient in all weather. I have sawed a molasses barrel in twain, and taking the two "tubs" to the trench, filled them, disturbing the lump of earth at the root as little as possible, breaking the decayed stalks off and packing closely upright. Taking the tubs to the cellar I pour a small bucket of water into each to keep roots moist. I am careful not to wet the leaves or stalks, as this might cause them to decay. This not only makes it very handy to get at, but the celery improves under this treatment.

In conclusion I will say: The main point in raising very fine celery is to keep it growing continuously. I have yet to see the person who has made celery growing a success, did he not set good plants on soil with a natural supply of moisture, or furnished the water artificially, and the latter plan is the most certain to give the amateur the most gratifying results. Always plant the dwarf kinds, as they are more easy of culture and more than possess all the good points of the taller growing sorts. Do not allow yourself to set more plants than you can attend to properly. One has no idea how much feasting there is in one hundred well grown plants. Three hundred such furnishe our family from October to March, and we are all fond of it, besides allowing for fully one-third which we give to neighbors.

HORTICULTURAL NOTES.

BY GRANVILLE COWING, OF INDIANA.

THE BANANA MUSKMELON.—This melon was offered to the public last spring and represented as being much like a banana in shape and color, but much larger, and of the most delicious flavor. I found it very productive, producing melons from fifteen to twenty-four inches in length, with flesh of a rich salmon color and in shape as represented; but while the flavor was passable, it was not as good as that of some of the old green-fleshed canteloupes, and consequently can not be regarded as worthy of general cultivation.

TO PRESERVE SPECIMEN BERRIES.—As soon as berries are fully grown and before they soften any, pick them off with stems, and immediately put them into alcohol diluted about one-third with rainwater. Allow them to stand ten days or two weeks in a cool place, then pour off and add fresh liquid

which may be a little stronger than the first. They will soon harden and may be kept a long while.

BLACKBERRY PLANTS FROM ROOT CUTTINGS.—If possible, blackberry roots should be taken up in autumn, cut in pieces two and a half or three inches in length, and planted at once, or intermingled with earth and placed in a cellar until spring. If kept in a cellar, on account of their disposition to sprout, they should be planted in the spring, as soon as the ground can be worked, in broad drills, four feet apart, and at least four inches deep. To insure strong plants, cuttings should be at least three inches from each other in the row. Such plants do not bear earlier nor more satisfactorily than sucker plants from established patches, but are more easily dug and packed, and are therefore preferred by nurserymen. In favorable seasons root cuttings often succeed well when roots are dug and prepared early in spring and planted where they are to grow.

EVERGREEN OR OREGON BLACKBERRY.—A few years ago a friend in Oregon sent me this blackberry, with the statement that it was a valuable variety in that region. It proved to be a rampant grower, with a trailing habit like the dewberry. Its foliage was elegantly cut and studded with the sharpest spines; but the few small berries produced by it were hard and flavorless and of no value whatever. For two years I have endeavored to destroy it, but find that it sprouts most persistently from its roots.

HEALTHFULNESS OF HORTICULTURE.—Perhaps there is no pursuit to which man inclines that is more beneficent in its results than horticulture. To those who take pleasure in it, it brings peace and the most pleasurable mental enjoyment, while it builds up the physical frame wasted by disease or rendered feeble by sedentary occupation. To it I doubtless owe a long extension of life. Twenty-eight years ago I was a wreck in health, and my physician warned me that I might die at any moment, and at best could not hope to live more than a few months. I was then thirty-four years of age; had always longed to live in the midst of green fields and cultivate fruits and flowers, but fortune had not allowed me to gratify that desire. Disease caused me to leave the city and go to the country without delay. After months of serious illness, I began to be able, with assistance, to visit my garden and note its flowers and fruits, and soon I was able to assist a little in their cultivation. I had many of the best flowers and small fruits, and as many were new to me, while I derived strength from their cultivation, my mind was kept in a state of most pleasurable excitement by their successive exhibitions of flowers and fruits; and to them I have hardly a doubt that I owe the term of existence I have since enjoyed. The fable of Antæus, who renewed his strength whenever he touched the earth, and who could be overcome by Hercules only when held in mid-air, conveys an idea that needs no interpreter to a multitude of invalids engaged in horticultural pursuits. Diocletian, one of the greatest of the Roman emperors, voluntarily resigned his throne and spent the remainder of his life in the enjoyment of his garden. No doubt thousands have regarded him as an object of pity, but

there are many other thousands whose minds are in accord with nature, and who can detect beauties veiled to more superficial eyes, who have never doubted that his last days were infinitely more happy than those spent on a throne.

FERTILIZATION OF STRAWBERRIES.—It is claimed by some strawberry growers that the color, shape, flavor, etc., of fruit produced by a pistillate strawberry will be largely determined by the variety used in fertilizing it. I have used Longworth's Prolific, Wilson, Cumberland Triumph and many other staminate sorts as fertilizers for McAvoy's Superior, Hovey's Seedling, Green Prolific, Crescent and other pistillate sorts, but have never seen the berries of the latter vary from their ordinary fixed type. When fructified by Sharpless I have never known Crescent to produce a coxcomb-shaped berry, nor Champion to fail to produce its usual proportion of flat berries when fertilized by Cumberland Triumph, a variety whose berries are uniformly conical. It seems reasonable to believe that impregnation of the strawberry can only affect the seed and can have no influence on the pulp in which it is imbedded. Variation in the fruit of a single variety may be more reasonably attributed to variation in soil. We send our fruits to the fertile soils of Kansas and California, and when specimens of them are returned to us we often fail to recognize them.

APPENDIX.

A PLEASANT EXCURSION TO SHELL BEACH.

Reference was made in the body of this volume to an excursion to Shell Beach, on Lake Borgne, which was tendered the Society by the officers of the railroad leading to that place. Monday, the 19th day of January, was spent in this excursion.

The Shell Beach Railroad follows the left bank of the Mississippi river for a distance of fourteen miles, in a southeasterly direction, from the city of New Orleans, thence making an almost right angle bend to the left, a distance of about fifteen miles further, to the gulf, or bay, known as Lake Borgne. This so-called lake is a bay extending up from the Gulf of Mexico, and is rendered historic as the landing place of the British army under the command of Gen. Packinham, which was so disastrously repulsed by Gen. Jackson a few days later at the very threshold of the city. The railroad follows the higher lands over the almost identical route traversed by the ill-fated army of Packinham, and also, near the city, passes through the battle-field, where, just seventy years and eleven days before the date of our pleasant excursion the most sanguinary and (unequal in its results) decisive struggle of that war occurred.

This railroad passes through some of the finest sugar lands of Louisiana, there being numerous *plantations* along the route that bear evidences of past prosperity, though at this time the sugar business is a waning industry.

Northern enterprise, aided by Southern capital, has built this railroad through these rich alluvial lands, formerly entirely devoted to the sugar industry, with a view to their conversion into vegetable gardens for Northern markets. Much has already been accomplished in this direction, and the officers of the company were not blind to their own interest and that of the country through which they operate, in foreseeing the value of such an advertisement as an excursion of this kind would be to them. This, from a business point of view, also from the true social and hospitable character of these people, no doubt prompted the invitation, which, accepted, afforded the members of the American Horticultural Society the pleasant and truly enjoyable excursion to

SHELL BEACH.

As intimated above, the members of the Society, many of them accompanied by wives, daughters and invited friends, to the number of near two

hundred, assembled at the Shell Beach Railroad Depot in the city of New Orleans early in the forenoon of January 19, 1885, where a special train officered by John R. Elder, President; M. R. Spelman, General Superintendent; and John T. Hardie and others, Directors, awaited our arrival. At the *Battle-field* the train halted, and without debarking, we were hastily informed by Superintendent Spelman as to the principal points of interest. One mile further on a second halt was made, which afforded an opportunity to all who wished, to visit the house which was Gen. Packinham's headquarters the night before the engagement, and in which he is said to have died after his wounds on the battle-field. The next stop was made at a sugar plantation, where the buildings and machinery so recently in active operation were examined. Nearer the Beach the birthplace and early home of Gen. Beauregard, of Confederate fame, was pointed out.

The season of the sugar harvest was closed at the time of our visit, and occasionally the early spring work was beginning. The seed cane, which is planted once in three years, and consists in the planting of the stalks themselves in a furrow, from which the young plant springs at the joints, was cut and covered lightly with earth in large beds, somewhat after the style of heeling in trees in the North. The cane remains in this condition until March and April when it is planted.

The train arrived at Shell Beach about noon, where the excursionists spent an hour or more in gathering specimens and enjoying the pleasant and refreshing Gulf breeze, after which they were called together at the Club House, where a bountiful lunch was served, followed by toasts and speeches by President Elder, of the railroad company, and President Earle of the Society, and others, after which the following resolutions were passed and the party were returned to the city:

WHEREAS, President Elder and Superintendent Spelman, of the Shell Beach Railroad Company, have so generously entertained the members of the American Horticultural Society, in bringing us by special train through the rich garden and sugar lands adjacent to the Crescent City, and amid scenes of some of the most stirring events in American history; and,

WHEREAS, They have further graced the company with their presence and have personally attended upon our refreshment with the excellent collation so abundantly provided for us, their guests; therefore be it

Resolved, That the hearty and unanimous thanks of this Society are hereby extended to these gentlemen and the corporation they represent for the courtesies thus shown us, with the assurance that we shall keep green in our minds the remembrance of this happy occasion.

Resolved, That we confidently commend these fertile lands through which we have passed, so rich in elements essential to the culture of garden products, with a climate so hospitable, and in near proximity to a great city, to the great army of market gardeners who are seeking new fields of conquest.

HORTICULTURAL DEPARTMENT

OF THE

WORLD'S EXPOSITION AT NEW ORLEANS.

In the second volume of Transactions of this Society may be found a general reference to the part horticulture had in store for the visitor at the World's Exposition of 1884–85, to be held in New Orleans; also, an architectural description of Horticultural Hall.

The location of Horticultural Hall is both well chosen and historic. It is situated near the great Father of Waters, whose turbid waves are only held in abeyance by the slender levee that alone saves the site from frequent inundations. It is surrounded by grand old live oaks and pecan trees, with their graceful curtains of Spanish moss. The planting of these trees dates far back of the present century and by subjects of a foreign potentate.

It is historic in the fact that the spot on which the hall now stands was the site of a military hospital during the late war; the fountain that now adorns the hall having served as a cistern for hospital uses, and said to have been erected by General Butler while in command of the Union forces at New Orleans.

This old hospital cistern, by the inspiration of an artist, has become the beautiful fountain, with its sparkling jets and cooling spray, surrounded by tropical verdure, that now so gracefully adorned the hall.

THE SURROUNDINGS.

Before visiting the hall, the reader will pardon me for suggesting a stroll through the horticultural grounds.

I have already intimated that long before the acquisition of Louisiana from the French, and while it was yet a province of Spain, the landscape gardener had placed an almost indelible mark upon the surroundings of Horticultural Hall. The grand old live oaks and pecan trees, which the visitor can not fail to admire, if not, indeed, to reverence, are fitting monuments to forgotten genius. The "Giant," a live oak measuring over twenty-seven feet in circumference, six feet from the ground, and whose evergreen boughs, draped

in moss, ferns and lichens, covers an area one hundred and fifty feet in diameter, has a worthy rival in the "Giantess," which stands near by, and is scarcely less in proportions, if, indeed, not surpassing in beauty. Many others adorn these grounds, the meanest of which would be a gem in a Central Park.

Under the Exposition management much was done to give additional beauty and interest to these grounds. Large sections were devoted to the exhibition of nursery stock, and here could be found specimens of almost every known species of trees, shrubs and plants, whether useful or ornamental, that are grown in this country. There was also a large space devoted to foreign plants and trees. Among collections of this class that deserved special mention I would name Mexico's exhibit. A peculiarity of the Mexican display was an ornamental garden planned and managed after their peculiar ideas of rural adornment. In this garden were plants, both ornamental and useful, among the latter of which the American Agave, or so called Century Plant, was both conspicuous from the immense size of individual specimens, weighing, as I was assured, over two tons each, with flower stalk almost ready to bloom, and from the fact that a drink (pulque) is prepared from the sap of the plant that in Mexico is as popular and as universally used as is beer among the Germans. A long row of these immense plants had been transplanted from their native country simply to furnish "pulque" to quench the thirst of numerous Mexicans who were attending the exhibition.

CALIFORNIA'S NURSERY STOCK, which excelled in scientific interest that of any other one collection, was under the intelligent supervision of Mr. W. G. Klee, of Berkley in that State. This collection was interesting, not only from the wide range of genera, species, and varieties it contained, but as well from its perfect botanical classification and scientific arrangement.

In addition to this interesting and valuable out-door collection, Mr. Klee had a large exhibit, embracing more tender species, in Horticultural Hall, which will receive proper notice further on.

Many of the States, and individuals as well, had large exhibits of fruit and ornamental trees and shrubbery, which were disposed in groups and plantations throughout the grounds, the esthetic effect of which was pleasing, aside from the valuable opportunity afforded of studying botanical character, habits, etc.

IN HORTICULTURAL HALL.

A hall perfectly adapted to the exhibition of fruits, plants, and flowers, can not be provided, from the fact that temperature and atmospheric conditions suited to the one would be far from appropriate for the others. This difficulty had, however, been as nearly overcome in the construction of this building as possibly could have been done. As the visitor entered the building, which is properly a large conservatory, he was greeted with a most pleasing and varied scene. Immediately in front were four lines of tables, six hundred feet in length, broken only at convenient intervals, and at the grand

fountain in the center of the building, literally loaded with the choicest fruits, gathered from more than thirty States, territories, and foreign countries, while of plants and trees the exhibit was even more extensive in its genera, species, and variety. Beyond doubt this exhibition excelled in general interest any horticultural display *ever made.*

THE FRUIT DISPLAY.

It is safe to estimate that fifty thousand plates of fruit were here exhibited during the term of the Exposition. At the beginning one-half of the space devoted to pomological exhibits was occupied by citrus fruits, mainly from Florida, though Jamaica, Mexico, California, Louisiana and Mississippi were each represented. The species represented were the citron, shaddock, grapefruit, lemon, orange and lime, while the varieties were numerous, especially of the orange. To the Northern visitor this citrus fruit show had peculiar interest, while to those living within the possible region of cultivation the lesson must have been a valuable one.

The remainder of the fruit tables were originally filled with apples, pears, grapes and other more hardy fruits. These were from England, the Canadas, Nebraska, California, Kansas, Iowa, Illinois, Massachusetts, Pennsylvania, Michigan, Ohio and Wisconsin—California and Nebraska leading in quantity, if not in quality.

As the exhibition progressed and as specimens decayed and were removed, other and fresh collections took their places on the tables, until almost every State in the Union and several foreign countries were represented. It would be impossible in a brief paper like this to attempt a detailed description of this mammoth fruit exhibition, and indeed it would be simple injustice to enter into any comparisons where each was so deserving. It is fair, however, to refer to the wide range of territory represented and to the effect of climate and soil on similar species and varieties which were here illustrated by collections.

England exhibited one hundred and seventy-five varieties of apples but few of which were familiar to Americans. This collection was not noted for its brilliancy of coloring and beauty, neither for the size of the specimens.

The French collection embraced about fifty varieties each of apples and pears. The apples as a rule were much finer and better colored than those from England. The pears from France were very fine, and included a number of varieties well known and quite generally cultivated in this country.

Russia's collection was small, owing to loss by decay in transit, embracing some half dozen or more varieties of apples and crabs. Here, however, was fairly illustrated that true type or "nationality" just now so prominently and energetically presented to our people by those indefatigable importers of Russian varieties, Prof. Budd, of Iowa, and Charles Gibb, of Quebec—brilliancy of coloring and beauty of bloom.

Among all the State exhibits of fruits, Wisconsin, perhaps, embraced the largest number of varieties of apples. Many of these varieties are new seedlings, originated in that State. Some of them are already named and, to a limited extent, disseminated, and are rapidly gaining in popularity, especially in the colder regions of our country. They are chiefly of the Russian strain, or crabs and their hybrids and crosses.

THE PLANT DISPLAY.

Aside from the orchid and cacti exhibits, which were very large and interesting, the chief feature of the plant show consisted of large and well-grown specimens of plants and trees of economic value. These were chiefly from Mexico, Central America, Jamaica, Florida and California, and embraced bearing trees of the cocoanut, coffee, date, tea, banana, India rubber, nutmeg, cinnamon, cinchona, camphor, vanilla, pine-apple, cochineal cactus, etc. In the California collection were to be found a large group of Australian trees and plants, many of which were strange and interesting in their habits. Here were several species of eucalyptus, including the celebrated blue gum tree, also a number of different acacias, some of which, when young, have beautiful pinnated foliage, but as they become older they lose this, and take to themselves foliage of a very different character. There was a number of palms of different species, including the cocoanut, date and royal, of large size, from twenty to thirty feet in height; also two large cactus plants from Arizona. These were conspicuous objects in the hall and a source of great interest to visitors. Later in the season the gaudy display of azaleas and the strange colorings and grotesque forms of orchids, within the hall, formed centers of attraction and interest, while outside the rhododendrons, roses, bulbs and pansies were sparkling gems of admiration.

The following is a complete list of premium awards which has been kindly furnished by Hon. Parker Earle, late Chief of the Department of Horticulture in the World's Exposition, and President of the American Horticultural Society. This list has not been (and probably will not be) published elsewhere, so that its publication here will constitute the only official record of awards in this, the greatest known horticultural exhibition. SECRETARY.

A LIST OF AWARDS

Made in the Department of Horticulture of the World's Exposition at New Orleans, in the Winter and Spring of 1885.

The following gentlemen all gave valuable service as judges of this department, several of them giving a number of weeks of exacting labor to the examination of the very extensive and varied exhibits, which aggregated over fifty thousand dishes of fruit and many acres of plants and trees:

LIST OF JUDGES.

DR. D. MORRIS, Director Government Botanic Gardens, Jamaica.
HON. P. J. BERCKMANS, Augusta, Ga.
HON. T. T. LYON, South Haven, Mich.
CHARLES H. HOVEY, ESQ., Boston, Mass.
S. D. WILLARD, ESQ., Geneva, N. Y.
G. W. CAMPBELL, ESQ., Delaware, Ohio.
HON. WILLIAM PARRY, Parry, N. J.
H. E. VAN DEMAN, ESQ., Geneva, Kan.
E. H. CALKINS, ESQ., Burlington, Iowa.
J. C. EVANS, ESQ., Harlem, Mo.
HON. ROBERT W. FURNAS, Brownville, Neb.
J. C. PLUMB, ESQ., Milton, Wis.
GEORGE HUSMANN, ESQ., Napa, Cal.
GEORGE B. BRACKETT, ESQ., Denmark, Iowa.
W. H. CASSELL, ESQ., Canton, Miss.
T. V. MUNSON, Esq., Denison, Texas.
W. H. BOOMKAMP, ESQ., New York.
JAMES DECKER, ESQ., Fern Creek, Ky.
DR. CHARLES MOHR, Mobile, Ala.
S. M. WIGGINS, ESQ, New Orleans.
DR. JOSEPH ALBRECHT, " "
J. FONTA, ESQ., " "
E. F. NELSON, ESQ., " "

DIVISION OF POMOLOGY.

For the purposes of this exhibition, the territory of the United States and the British Provinces was considered as divided into three fruit districts, as follows: 1. The British Provinces in North America, and that part of the United States east of the Rocky Mountains and north of the parallel of 40, to be known as the "*Northern District.*" 2. That portion of the United States east of the Rocky Mountains and south of the parallel of 40, to be known as the "*Southern District.*" 3. The States and Territories west of the Rocky Mountains to be known as the "*Pacific District.*"

APPLES—FOREIGN EXHIBITS.

Best collection, 100 varieties, by individual grower or collector, J. Cheal & Sons, Crowley, Sussex, England.....Gold Medal. $150
Best collection, 50 varieties, by individual grower or collector, Société d'Horticulture, Orleans, France.....Silver Medal. 100

Best collection, 20 varieties, by individual grower or collector, J. Cheal & Sons, England	Silver Medal.	$50
Best collection, 10 varieties, by individual grower or collector, J. Cheal & Sons, England	Silver Medal.	30
Best collection, 5 varieties, by individual grower or collector, J. Cheal & Sons, England	Silver Medal.	20
Best plate of Beauty of Kent, J. Cheal & Sons, England		6
Best plate of Beauty of Hants, J. Cheal & Sons, England		6
Best plate of Blenheim Pippin, J. Cheal & Sons, England		6
Best plate of Boston Russet, Société d'Horticulture, Orleans, France		6
Best plate of Calville Blanche, Croux & Fils, Paris, France		6
Best plate of Calville Rouge, Croux & Fils, Paris, France		6
Best plate of Coxe's Orange Pippin, J. Cheal & Sons, England		6
Best plate of Emperor Alexander, J. Cheal & Sons, England		6
Best plate of Lady Apple, Croux & Fils, Paris, France		6
Best plate of Menagere, Société d'Horticulture, Orleans, France		6
Best plate of Newtown Pippin, Croux & Fils, France		6
Best plate of Reinette du Canada, Croux & Fils, France		6
Best plate of Ribston Pippin, Société d'Horticulture, Orleans, France		6
Best plate of The Queen, J. Cheale & Sons, England		6
Best plate any other variety, J. Cheal & Sons, England		6
Best plate of any variety, Croux & Fils, France		10

AMERICAN EXHIBITS—NORTHERN DISTRICT.

Best and largest collection, not exceeding 200 varieties, by any Horticultural Society, Wisconsin State Horticultural Society	Gold Medal.	200
Best collection, 100 varieties, by any Horticultural Society, Wisconsin State Horticultural Society	Silver Medal.	100
Best and largest collection, not exceeding 200 varieties, by individual, A. C. Hammond, Warsaw, Ill.	Gold Medal.	200
Best collection, 100 varieties, by individual, James T. Johnson, Warsaw, Ill	Silver Medal.	100
Best collection, 50 varieties, by individual, E. M. Guffin, Iowa City, Iowa.	Silver Medal.	75
Best collection, 25 varieties, by individual, G. B. Brackett, Denmark, Iowa	Silver Medal.	50
Best collection, 10 varieties, by individual, Geo. Seagrove, Spring Lake, Mich	Silver Medal.	25
Best collection, 5 varieties, by individual, J. M. Smith, Green Bay, Wis.	Silver Medal.	15
Best collection, 3 varieties, for Autumn, by individual, J. M. Smith, Green Bay, Wis	Silver Medal.	15
Best collection, 3 varieties, for Winter, by individual, N. W. Cook, Grand Rapids, Mich.	Silver Medal.	15

Best collection, 50 or more varieties, for and adapted to severe winter climates, Geo. P. Peffer, Pewaukee, Wis.....Silver Medal. $100

Best collection, 20 varieties, for and adapted to severe winter climates, Jno. B. Mead, Randolph, Vt.....Silver Medal. 50

Best collection, 10 varieties, for and adapted to severe winter climates, Geo. P. Peffer, Pewaukee, Wis.....Silver Medal. 30

Best collection, 5 varieties, for and adapted to severe winter climates, Wm. A. Springer, Fremont, Wis.....Silver Medal. 25

Best collection, 3 varieties or more, grown on ancient trees, not less than 100 years old, age and location of trees to be given and considered by the judges, T. S. Gold, West Cornwall, Conn.....Silver Medal. 25

(The varieties were R. I. Greening, Westfield Seeknofurther, Am. Gol. Russet. The trees are growing on Mr. Gold's farm; were planted by his grandfather, and long ago top-grafted.)

Best plate of American Golden Russet, A. J. Haviland, Fort Dodge, Iowa..... 5

Best plate of Alexander, Geo. P. Peffer, Pewaukee, Wis..... 5

Best plate of Ben Davis, Hiram Craig, Fort Calhoun, Neb..... 5

Best plate of Baldwin, A. M. Hale, Mogadore, Ohio..... 5

Best plate of Bailey's Sweet, J. McDiamid, Bear Lake, Mich..... 5

Best plate of Blue Pearmain, J. M. Smith, Green Bay, Wis..... 5

Best plate of Cayuga Red Streak, J. W. Van Deman, Benzonia, Mich.... 5

Best plate of Canada Reinette, Daniel Duer, Millersburg, Ohio..... 5

Best plate of Colvert, J. M. Smith, Green Bay, Wis..... 5

Best plate of Cooper's Market, J. F. Taylor, Douglas, Mich..... 5

Best plate of Duchess of Oldenburg, J. M. Smith, Green Bay, Wis..... 5

Best plate of Danver's Winter Sweet, C. S. Pope, Manchester, Maine.... 5

Best plate of Esopus Spitzenburg, Wm. Saunders, London, Ont..... 5

Best plate of English Golden Russet, Geo. P. Peffer, Pewaukee, Wis..... 5

Best plate of Fall Wine, A. C. Hammond, Warsaw, Ill..... 5

Best plate of Fameuse, George P. Peffer, Pewaukee, Wis..... 5

Best plate of Flushing Spitzenburg, Neil Munroe, Elk Rapids, Mich.... 5

Best plate of Gravenstein, C. S. Pope, Manchester, Maine..... 5

Best plate of Grimes' Golden, C. N. Dennis, Hamilton, Ill 5

Best plate of Hunt's Russet, George A. Deitz, Chambersburg, Pa..... 5

Best plate of Herefordshire Pearmain, J. M. Smith, Green Bay, Wis.... 5

Best plate of Hubbardston, C. N. Dennis, Hamilton, Ill..... 5

Best plate of Jonathan, J. P. B. Day, Castana, Iowa..... 5

Best plate of King (of Tompkins), C. S. Pope, Manchester, Maine..... 5

Best plate of Lady, C. N. Dennis, Hamilton, Ill..... 5

Best plate of Longfield, J. M. Smith, Green Bay, Wis..... 5

Best plate of Maiden's Blush, A. C. Hammond, Warsaw, Ill..... 5

Best plate of Mother, C. N. Dennis, Hamilton, Ill..... 5

Best plate of Melon, J. M. Smith, Green Bay, Wis..... 5

Best plate of Mann, Neil Munroe, Elk Rapids, Mich..... 5

Best plate of McAfee, Samuel Barnard, Table Rock, Neb..... $5
Best plate of Marston's Red, J. M. Smith, Green Bay, Wis..... 5
Best plate of Northern Spy, Neil Munroe, Elk Rapids, Mich..... 5
Best plate of Newtown, C. N. Dennis, Hamilton, Ill..... 5
Best plate of Ortley, R. G. Moon, Bedford, Iowa..... 5
Best plate of Paradise Winter Sweet, A. C. Hammond, Warsaw, Ill..... 5
Best plate of Porter, C. N. Dennis, Hamilton, Illinois..... 5
Best plate of Pomme Grise, J. F. Taylor, Douglas, Mich..... 5
Best plate of Pewaukee, Geo. P. Peffer, Pewaukee, Wis..... 5
Best plate of Peck's Pleasant, H. C. Raymond, Council Bluffs, Iowa..... 5
Best plate of Rambo, C. N. Dennis, Hamilton, Illinois..... 5
Best plate of Rome Beauty, C. Chickering, Red Oak, Iowa..... 5
Best plate of Rawle's Janet, Mrs. C. C. Sabin, State Center, Iowa..... 5
Best plate of Red Canada, J. C. Woodruff, Hastings, Mich..... 5
Best plate of Ribston, Wm. Saunders, London, Ont..... 5
Best plate of Roman Stem, Samuel Rowe, Oskaloosa, Iowa..... 5
Best plate of Rhode Island Greening, S. Rice, Bear Lake, Mich..... 5
Best plate of Roxbury Russet, A. M. Hale, Mogadore, Ohio..... 5
Best plate of Smith's Cider, Samuel Barnard, Table Rock, Neb..... 5
Best plate of St. Lawrence, Geo. P. Pefler, Pewaukee, Wis..... 5
Best plate of Tallman Sweet, Geo. P. Peffer, Pewaukee, Wis..... 5
Best plate of Vandevere, Samuel Barnard, Table Rock, Neb..... 5
Best plate of Winesap, Samuel Barnard, Table Rock, Neb..... 5
Best plate of Willow, Hiram Craig, Fort Calhoun, Neb..... 5
Best plate of Wealthy, Minnesota Horticultural Society..... 5
Best plate of White Winter Pearmain, Mrs. Mary A. McGee, Council Bluffs, Iowa..... 5
Best plate of Wagoner, T. E. Elliott, ——..... 5
Best plate of Walbridge, Geo. P. Peffer, Pewaukee, Wis..... 5
Best plate of White Pippin, Daniel Duer, Millersburg, O..... 5
Best plate of Westfield, E. M. Guffin, Iowa City, Iowa..... 5
Best plate of Wolf River, J. M. Smith, Green Bay, Wis..... 5
Best plate of Yellow Bellflower, Samuel Barnard, Table Rock, Neb..... 5
Best plate any other variety, Geo. Turner, Clarinda, Iowa, (for Striped Pippin..... 5
Best plate any variety, Daniel Duer, Millersburg, O, (for Grimes' Golden)..... 10
Best plate of the largest and handsomest apples, W. A. Springer, Fremont, Wis., (for Wolf River)..... 10
Best new Autumn variety, not generally introduced, J. M. Smith, Green Bay, Wis., (for Wolf River)..... 10
Best new Winter variety, not generally introduced, C. N. Dennis, Hamilton, Ill., (for Winter Rambo)..... 10
Best collection Crab Apples, 10 varieties or more, Geo. P. Peffer, Pewaukee, Wis..... 20

SOUTHERN DISTRICT.

Best and largest collection, not exceeding 200 varieties, by any Horticultural Society, Missouri State Horticultural Society...Gold Medal. $200
Best collection, 100 varieties, by any Horticultural Society, Missouri State Horticultural Society .....Silver Medal. 100
Best and largest collection, not exceeding 200 varieties, by individual, E. F. Babcock, Little Rock, Ark.....Gold Medal. 200
Best collection, 100 varieties, by individual, B. F. Pancoast, Iola, Kas. Silver Medal. 100
Best collection, 50 varieties, by individual, L. A. Goodman, Westport, Mo.....Silver Medal. 75
Best collection, 25 varieties, by individual, Alexander Shaw, Denver, Col.....Silver Medal. 50
Best collection, 10 varieties, by individual, W. M. Samuels, Clinton, Ky. Silver Medal. 25
Best collection, 5 varieties, by individual, F. C. Rainey, Columbia, Tenn. Silver Medal. 15
Best collection, 3 varieties for Autumn, by individual, Alexander Shaw, Denver, Col .....Silver Medal. 15
Best collection, 3 varieties, for Winter, by individual, W. M. Samuels, Clinton, Ky .....Silver Medal. 15
Best plate from most ancient trees, Missouri State Horticultural Society.....Silver Medal. 10
Best plate of Ben Davis, S. T. Cole, Boonsboro, Ark..... 5
Best plate of Black Warrior, W. M. Samuels, Clinton, Ky..... 5
Best plate of Broadwell, Missouri State Horticultural Society..... 5
Best plate of Buckingham, Missouri Horticultural Society..... 5
Best plate of Buncombe, W. M. Samuels, Clinton, Ky..... 5
Best plate of Cannon Pearmain, Missouri Horticultural Society..... 5
Best plate of Chattahoochie, W. M. Samuels, Clinton, Ky..... 5
Best plate of Carolina Greening, J. R. Hurst, Chillicothe, Ohio 5
Best plate of Cooper's Market, W. M. Samuels, Clinton, Ky 5
Best plate of Cullasaga, W. M. Samuels, Clinton, Ky..... 5
Best plate of Disharoon, W. M. Samuels, Clinton, Ky..... 5
Best plate of Esopus Spitzenburg, W. M. Samuels, Clinton, Ky..... 5
Best plate of Fameuse, Allen County (Kan.) Horticultural Society..... 5
Best plate of Gilpin, John Storms, Ozone, Ark..... 5
Best plate of Grimes' Golden, Missouri Horticultural Society..... 5
Best plate of Horn, W. M. Samuels, Clinton, Ky..... 5
Best plate of Huntsman, W. Folck, Marshall, Mo..... 5
Best plate of Jonathan, Missouri Horticultural Society..... 5
Best plate of Kittageskee, W. M. Samuels, Clinton, Ky 5
Best plate of Lawver, G. Williams, Hindsville, Ark..... 5
Best plate of Lady, Missouri Horticultural Society..... 5
Best plate of Magnum, Missouri Horticultural Society..... 5

Best plate of Maverick Sweet, W. M. Samuels, Clinton, Ky..... $5
Best plate of Maiden's Blush, Missouri Horticultural Society..... 5
Best plate of Mother, Missouri Horticultural Society,.. 5
Best plate of May (of Myers), Missouri Horticultural Society..... 5
Best plate of Missouri, Allen County (Kan.) Horticultural Society..... 5
Best plate of Moultrie's Winter, W. M. Samuels, Clinton, Ky 5
Best plate of Newton, Alexander Shaw, Denver, Col..... 5
Best plate of Ortley, W. Folck, Marshall, Mo..... 5
Best plate of Porter, Missouri Horticultural Society..... 5
Best plate of Pryor's Red, W. Folck, Marshall, Mo..... 5
Best plate of Paradise Winter Sweet, Missouri Horticultural Society... 5
Best plate of Rome Beauty, G. F. Cannon, Brightwater, Ark..... 5
Best plate of Rambo, Allen County (Kan.) Horticultural Society..... 5
Best plate of Red Canada, Missouri Horticultural Society..... 5
Best plate of Roman Stem, Allen County (Kan.) Horticultural Society.. 5
Best plate of Rawles' Janet, Allen County (Kan.) Horticultural Society.. 5
Best plate of Roxbury Russet, Mississippi Horticultural Society 5
Best plate of Rhode Island Greening, Missouri Horticultural Society... 5
Best plate of Sauta, Mississippi Horticultural Society..... 5
Best plate of Shockley, J. W. Phipps, ——, Ark..... 5
Best plate of Shannon, S. T. Cole, Boonsboro, Ark..... 5
Best plate of Smith's Cider, Allen County (Kan.) Horticultural Society 5
Best plate of Tallman Sweet, Missouri Horticultural Society..... 5
Best plate of Willow, J. Brunk, Boonsboro, Ark..... 5
Best plate of Winesap, Allen County (Kan.) Horticultural Society 5
Best plate of White Winter Pearmain, J. M. Wade, Boonsboro, Ark..... 5
Best plate of Wagoner, Missouri Horticultural Society..... 5
Best plate of White Pippin, Missouri Horticultural Society..... 5
Best plate of Yellow Bellflower, John Storms, Ozone, Ark 5
Best plate of York Imperial, Missouri Horticultural Society..... 5
Rest plate of Yates, Horace Rainey, Columbia, Tenn..... 5
Best plate of any variety, E. F. Babcock, Little Rock, Ark. (for Shannon) 10
Best 20 varieties for the extreme South, W. M. Samuels, Clinton, Ky.. 50
Best 10 varieties for the extreme South, Miss. Horticultural Society..... 30
Best 5 varieties for the extreme South, E. F. Babcock, Little Rock, Ark. 25
Best new autumn variety, not generally introduced, Mississippi Horticultural Society..... 10
Best new winter variety, not generally introduced, Missouri Horticultural Society..... 10
Best plate of the largest and handsomest apples, E. F. Babcock, Little Rock, Ark. (for Shannon)..... 10

PACIFIC DISTRICT.

Best collection, 50 varieties, by individual, W. H. Jessup, Haywards, Cal. .....Silver Medal. 75

Best collection, 25 varieties, by individual, C. W. Bell, Los Angeles, Cal.....Silver Medal. $50
Best collection, 10 varieties, by individual, W. W. Broughton, Humboldt county, Cal .....Silver Medal. 25
Best collection, 5 varieties, by individual, Bliss & Harrison—California, Silver Medal. 15
Best collection, 3 varieties, for Autumn, D. O. Sleeper, Lake county, California.....Silver Medal. 15
Best collection, 3 varieties, for Winter, W. H. Jessup, Haywards, Cal., Silver Medal. 15
Best collection, 5 varieties, grown in and adapted to the coast climate, E. W. Allen, Portland, Oregon.....Silver Medal. 25
Best collection, 5 varieties, grown in and adapted to mountain climate, E. W. Allen, Portland, Oregon.....Silver Medal. 25
Best collection, 5 varieties, grown in and adaptod to the climate of the dry valleys, F. D. Long, Marin county, Cal .....Silver Medal. 25
Best plate of Ben Davis, Bliss & Harrison, ———, California..... 5
Best plate of Baldwin, E. W. Allen, Portland, Oregon..... 5
Best plate of Blue Pearmain, E. W. Allen, Portland, Oregon 5
Best plate of Esopus Spitzenburg, G. Scudamore, Lake county, Cal..... 5
Best plate of Jonathan, Hensell & Son, ———, Cal..... 5
Best plate of King (of Tompkins), G. Scudamore, Lake Co., Cal..... 5
Best plate of Northern Spy, E. W. Allen, Portland, Ore..... 5
Best plate of Newton, —— Benson, ———, Cal..... 5
Best plate of Ortley, E. W. Allen, Portland, Ore..... 5
Best plate of Rhode Island Greening, D. C. Feely, Patchen, Cal..... 5
Best plate of Roxbury Russet, —— Tallant, ———, Cal..... 5
Best plate of Smith's Cider, D. C. Feely, Patchen, Cal..... 5
Best plate of Vandevere, W. H. Jessup, Haywards, Cal..... 5
Best plate of Winesap, Nathan Smith, Lake Co., Cal..... 5
Best plate of Winter Pearmain, Mrs. P. English, Lake Co., Cal..... 5
Best plate of Wagoner, W. H. Jessup, Haywards, Cal..... 5
Best plate of Yellow Bellflower, D. C. Feely, Patchen, Cal..... 5
Best plate, any variety, W. H. Jessup, Haywards, Cal..... 10

SPECIAL PREMIUMS.

The judges recommended the award of special premiums as follows:

N. Ziganoff, Moscow, Russia, Silver Medal, for 10 varieties of apples.

The Mexican Government, Silver Medal, for 5 plates of apples.

Geo. L. Shoup, Boise City, Idaho, Silver Medal, for 10 varieties of apples, of very superior appearance.

PEARS—FOREIGN EXHIBITS.

Best collection, 50 varieties, from individual or Society, from any foreign country, Croux & Fils, Paris, France.....Silver Medal. $100

Best collection, 25 varieties, from individual or Society, from any foreign country, Société d'Horticulture, Orleans, France...Silver Medal.	$75
Best collection, 10 varieties, from individual or Society, from any foreign country, Croux & Fils, Paris, France .....Silver Medal.	40
Best collection, 5 varieties, from individual or Society, from any foreign country, Croux & Fils, Paris, France.....Silver Medal.	25
Best plate of Beurre d'Aremberg, Croux & Fils, Paris, France.....	6
Best plate of Beurre Bretonneau, Croux & Fils, Paris, France.....	6
Best plate of Doyenne d'Alencon, Croux & Fils, Paris, France.....	6
Best plate of Josephine de Malines, Croux & Fils, Paris, France.....	6
Best plate of Passe Colmar, Croux & Fils, Paris, France.....	6
Best plate of Uvedale's St. Germain, Croux & Fils, Paris, France.....	6
Best plate of any variety, Croux & Fils, Paris, France (for Passe Crassane).....	10

AMERICAN EXHIBITS—NORTHERN DISTRICT.

Best collection, 20 varieties, W. R. Ward, Newark, N. J.....Silver Medal.	50
Best collection, 10 varieties, W. R. Ward, Newark, N. J.....Silver Medal.	25
Best plate of any variety, W. R. Ward, Newark, N. J., for Abbott.....	10
Handsomest plate, 12 specimens, Wm. Parry, Parry, N. J., (for Kieffer).	10
Best plate, largest and handsomest Pears, Wm. Parry, Parry, N. J., (for Kieffer).....	10
Best plate of Anjou, W. R. Ward, Newark, N. J.....	5
Best plate of Clairgeau, W. R. Ward, Newark, N. J.....	5
Best plate of Columbia, W. R. Ward, Newark, N. J.....	5
Best plate of Duchess, W. R. Ward, Newark, N. J.....	5
Best plate of Dana's Hovey, W. R. Ward, Newark, N. J.....	5
Best plate of Kieffer, Wm. Parry, Parry, N. J.....	5
Best plate of Seckel, W. R. Ward, Newark, N. J.....	5
Best plate of Sheldon, W. R. Ward, Newark, N. J.....	5
Best plate of Vicar, W. R. Ward, Newark, N. J.....	5
Best plate of Winter Nellis, George P. Peffer, Pewaukee, Wis.....	5

SOUTHERN DISTRICT.

Best collection, 3 varieties, for Autumn, by individual or Society, W. M. Samuels, Clinton, Ky.....Silver Medal.	15
Best collection, 3 varieties, for Winter, by individual or Society, Mississippi Horticultural Society.....Silver Medal.	15
Best plate of Anjou, W. M. Samuels, Clinton, Ky.....	5
Best plate of Easter, W. M. Samuels, Clinton, Ky.	5
Best plate of Clairgeau, W. M. Samuels, Clinton, Ky.....	5
Best plate of Duchess, W. M. Samuels, Clinton, Ky.....	5
Best plate of Le Conte, W. W. Thompson, Smithville, Ga.....	5
Best plate of Lawrence, W. M. Samuels, Clinton, Ky.....	5
Best plate of any variety, Mississippi Horticultural Society, for Beurre Diel.....	10

Handsomest plate, 12 specimens, any variety, W. M. Samuels, Clinton, Ky., for Beurre Easter $10
Best plate, largest and handsomest pears, any variety, Mississippi Horticultural Society, (for Pound.) 10

PACIFIC DISTRICT.

Best collection, 5 varieties, by individual or Society, F. A. Kimball, National City, Cal. ..... Silver Medal. 15
Best plate, any variety, F. A. Kimball, National City, Cal., (for Winter Nellis) 10
Handsomest plate, 12 specimens, any variety, F. A. Kimball, National City, Cal., (for Pound) 10
Best plate, largest and handsomest pears, any variety, W. H. Jessup, Haywards, Cal., for President 10
Best plate of Easter, B. Bole, Lake Co., Cal. 5
Best plate of Pound, J. McDermott, Placer Co., Cal. 5
Best plate of Vicar, W. H. Jessup, Haywards, Cal. 5
Best plate of Winter Nellis, W. H. Jessup, Haywards, Cal. 5

GRAPES—NORTHERN DISTRICT.

Best collection, 10 varieties, by individual or Society, Minnesota Horticultural Society ..... Silver Medal. 25
Best collection, 5 varieties, for table, by individual or Society, Minnesota Horticultural Society ..... Silver Medal. 15
Best collection, 5 varieties, for wine, by individual or Society, Minnesota Horticultural Society ..... Silver Medal. 15
Best plate, any variety, grown in open air, Geo. W. Campbell, Delaware, Ohio, for Cadella 10
Largest and handsomest bunch, grown in open air, Geo. W. Campbell, Delaware, Ohio, for Catawba 10
Best plate of Agawam, Geo. P. Peffer, Pewaukee, Wis. 5
Best plate of Brighton, Minnesota Horticultural Society 5
Best plate of Concord, Minnesota Horticultural Society 5
Best plate of Catawba, Minnesota Horticultural Society 5
Best plate of Delaware, Minnesota Horticultural Society 5
Best plate of Duchess, A. J. Caywood, Marlboro, N. Y. 5
Best plate of Iona, Minnesota Horticultural Society 5
Best plate of Jefferson, Geo. W. Campbell, Delaware, Ohio 5
Best plate of Lindley, Minnesota Horticultural Society 5
Best plate of Massasoit, Minnesota Horticultural Society 5
Best plate of Prentiss, T. S. Hubbard, Fredonia, N. Y. 5
Best plate of Salem, Geo. P. Peffer, Pewaukee, Wis 5
Best plate of Wilder, Minnesota Horticultural Society 5

PACIFIC DISTRICT.

Best collection, 10 varieties, by individual or Society, D. C. Feely, Patchen, Santa Clara Co., Cal.	Silver Medal.	$25
Best collection, 5 varieties, for table, by individual or Society, D. C. Feely, Santa Clara Co., Cal.	Silver Medal.	15
Best collection, 5 varieties, for wine, by individual or Society, D. C. Feely, Santa Clara Co., Cal.	Silver Medal.	15
Best plate of any variety, O. Livermore, Natoma, Cal.		10
Best and largest bunch, any variety, D. C. Feely, Patchen, Santa Clara Co., Cal.		10
Best plate of Black Hamburg, D. C. Feely, Patchen, Santa Clara Co., Cal.		5
Best plate of Black Morocco, D. C. Feely, Patchen, Santa Clara Co., Cal.		5
Best plate of Coneshon, D. C. Feely, Patchen, Santa Clara Co., Cal.		5
Best plate of Emperor, D. C. Feely, Patchen, Santa Clara Co., Cal.		5
Best plate of Rose of Peru, D. C. Feely, Patchen, Santa Clara Co., Cal.		5
Best plate of Old Mission, D. C. Feely, Patchen, Santa Clara Co., Cal		5
Best plate of Verdal, D. C. Feely, Patchen, Santa Clara Co., Cal.		5
Best plate of White Muscat of Alexandria, D. C. Feely, Patchen, Santa Clara Co., Cal.		5
Best plate of Flame Tokay, O. Livermore, Natoma, Cal.		5

PEACHES.

Best plate of any old variety, Mississippi Horticultural Society, (for Baldwin's Late.)		10

PLUMS.

Best collection, 10 varieties or more, D. L. Garver, Hart, Mich.	Silver Medal.	50

STRAWBERRIES.

Best plate of any variety exhibited in January, Dr. H. E. McKay, Madison Station, Miss.		10
Best plate of any variety exhibited in March, Dr. H. E. McKay, Madison Station, Miss.		10
Best collection, 10 varieties, exhibited in April, Dr. H. E. McKay, Madison Station, Miss.		50
Best plate of Neunan, exhibited in April, Dr. H. E. McKay, Madison Station, Miss.		5
Best plate of Cumberland Triumph, exhibited in April, Dr. H. E. McKay, Madison Station, Miss.		5
Best plate of any variety exhibited in April, Dr. H. E. McKay, Madison Station, Miss., (for Neunan)		10

SPECIAL PREMIUMS.

The following premiums were recommended for special award by the judges:

To D. C. Feely, Patchen, Santa Clara county, Cal., $5.00 a plate for the following: Seedless Sultana, Larga Bloom, Riesling, Purple Damascus, Black Malvoisie, Hamburg Muscat; also a diploma for the best general display of grapes from the Pacific Coast.

To H. P. Livermore, Natuma, Cal., for a plate of Black Ferrara grapes, $5

To T. T. Lyon, South Haven, Mich., for plate of "Micado" pears, $5.

To Wm. Parry, Parry, N. J., for a fine display of Kieffer pears, $10, and for a display in glass of unusual excellence and beauty, a silver medal.

TROPICAL FRUITS.

ORANGES.

Best collection, not less than 20 varieties, from any State or any foreign country, Riverside Fruit Co., Riverside, Cal	Gold Medal.	$100
Best collection, 10 varieties, from any State or foreign country, Kimball Bros, National City, Cal	Silver Medal.	50
Best collection, 5 varieties, from any State or foreign country, John Anderson, Ormond, Fla	Silver Medal.	25
Best plate of any variety from any State or foreign country, Kimball Bros, National City, Cal., (for Australian Navel)	Silver Medal.	10
Best collection, not less than 20 varieties, from any foreign country, the State of Sonoma, Mexico	Gold Medal.	100
Best collection, 5 varieties, from any foreign country, the Botanical Department, Jamaica	Silver Medal.	25

From the United States.

Best collection, not less than 20 varieties, Riverside Fruit Co., Riverside, Cal	Gold Medal.	100
Best collection, 15 varieties, John Anderson, Ormond, Fla.	Silver Medal.	75
Best collection, 10 varieties, John Anderson, Ormond, Fla.	Silver Medal.	50
Best collection, 5 varieties, James Bettner, Riverside, Cal.	Silver Medal.	25
Best plate of Acapulco, Kimball Bros, National City, Cal		5
Best plate of Bothilha. E. H. Hart, Federal Point, Fla		5
Best plate of Beach's No. 1, E. H. Hart, Federal Point, Fla		5
Best plate of Creole, Kimball Bros., National City, Cal		5
Best plate of Dummitt, John Anderson, Ormond, Fla		5
Best plate of Du Roi, W. B. Russell, Riverside, Cal		5
Best plate of Dulcissima, E. H. Hart, Federal Point, Fla		5
Best plate of Exquisite, E. H. Hart, Federal Point, Fla		5

Best plate of Early Oblong, E. H. Hart, Federal Point, Fla		$5
Best plate of Hart's Tardive, E. H. Hart, Federal Point, Fla		5
Best plate of Homosassa, O. P. Rooks, Fruitland Park, Fla		5
Best plate of Jaffa, O. P. Rooks, Fruitland Park, Fla		5
Best plate of Majorca, E. H. Hart, Federal Point, Fla		5
Best plate of Magnum Bonum, O. P. Rooks, Fruitland Park, Fla		5
Best plate of Maltese Blood, O. P. Rooks, Fruitland Park, Fla		5
Best plate of Maltese Oval, Kimball Bros., National City, Cal.		5
Best plate of Mediterranean Sweet, O. P. Rooks, Fruitland Park, Fla		5
Best plate of Marmalade, or Sour Seville, O. P. Rooks, Fruitland Park, Fla.		5
Best plate of Mandarin, O. P. Rooks, Fruitland Park, Fla		5
Best plate of Navel, or Bahia, E. H. Hart, Federal Point, Fla		5
Best plate of Washington Navel, Jas. Bettner, Riverside, Cal		5
Best plate of Double Imperial Navel, Pearley & Pattee, Riverside, Cal		5
Best plate of Nonpareil, E. H. Hart, Federal Point, Fla		5
Best plate of Osceola, Kimball Bros., National City, Cal		5
Best plate of Old Vini, O. P. Rooks, Fruitland Park, Fla		5
Best plate of Prata, E. H. Hart, Federal Point, Fla		5
Best plate of St. Michael, Kimball Bros., National City, Cal		5
Best plate of St. Michael Egg, Kimball Bros., National City, Cal		5
Best plate of Sweet Seville, H. J. Rudsill, Riverside, Cal		5
Best plate of Satsuma, John Anderson, Ormond, Fla		5
Best plate of Tahiti, W. E. Keith, Riverside, Cal		5
Best blate of Tangerine, E. H. Hart, Federal Point, Fla		5
Best plate of any other variety, O. P. Rooks, Fruitland Park, Fla., (for Cunningham)		5
Best plate of any variety, F. L. Dancy, Orange Mills, Fla., (for Madam Vinous)	Silver Medal.	10
Best box of oranges, packed for market, regard being had to neatness of box, quality of fruit, and best packing to secure keeping of fruit during and after transportation. The entries for this premium will be limited to fifty, C. B. Magruder, Rock Ledge, Fla		25
Best collection, not less than 20 varieties, grown in Florida, E. H. Hart, Federal Point, Fla	Gold Medal.	100
Best collection, 15 varieties, grown in Florida, C. B. Magruder, Rock Ledge, Fla	Silver Medal.	75
Best collection, 10 varieties, grown in Florida, E. H. Hart, Federal Point, Fla	Silver Medal.	50
Best collection, 5 varieties, grown in Florida, O. P. Rooks, Fruitland Park, Fla	Silver Medal.	25
Best plate of any variety, grown in Florida, C. B. Magruder, Rock Ledge, Fla	Silver Medal.	10
Best collection, not less than 20 varieties, grown on Gulf Coast, west of Florida, Mississippi Horticultural Society	Gold Medal.	100

Best collection, 15 varieties, grown on Gulf Coast, west of Florida, Mississippi Horticultural Society .....Silver Medal. $75
Best collection, 5 varieties, grown on Gulf Coast, west of Florida, Mississippi Horticultural Society.....Silver Medal. 25
Best plate of any variety, grown on Gulf Coast, west of Florida, Mississippi Horticultural Society.....Silver Medal. 10
Best collection, not less than 20 varieties, grown in California, Riverside Fruit Co., Riverside, Cal.....Gold Medal. 100
Best collection, 15 varieties, grown in California, Kimball Bros., National City, Cal.....Silver Medal. 75
Best collection, 10 varieties, grown in California, Kimball Bros., National City, Cal .....Silver Medal. 50
Best collection, 5 varieties, grown in California, Kimball Bros., National City, Cal.....Silver Medal. 25
Best plate of any variety, grown in California, Jas. Bettner, Riverside, Cal.....Silver Medal. 10
Best Orange tree, growing in tub or pot, in flower or fruit, grown in United States, E. F. Nelson, New Orleans, La.....Silver Medal. 100

LEMONS, ETC.

Best collection, not less than 5 varieties, from any State or country, Riverside Fruit Co., Riverside, Cal.....Silver Medal. 25
Best collection, not less than 5 varieties, from the United States, W. N. Mann, Riverside, Cal.....Silver Medal. 25
Best plate of Sicily, from the United States, G. W. Garcelon, Riverside, 5
Cal..... 5
Best plate of Genoa, from the United States, Jas. Bettner, Riverside, Cal. 5
Best plate of Eureka, from the United States, Kimball Bros., National City, Cal..... 5
Best plate of Belair, from the United States, O. P. Rooks, Fruitland Park, Fla..... 5
Best plate of Lamb, from the United States, John Anderson, Ormond, Fla..... 5
Best plate of any other variety, from the United States, Jas. Bettner, Riverside, Cal..... 5
Best plate of any variety, from the United States, P. D. Cover, Riverside, Cal.....Silver Medal. 10
Best plate of Persian Limes, 12 specimens, O. P. Rooks, Fruitland Park, Fla..... 5
Best plate of Giant Seedling Limes, 12 specimens, Kimball Bros., National City, Cal..... 5
Best plate of any variety Limes, O. P. Rooks, Fruitland Park, Fla..... 5
Best plate of Red-fruited Shaddocks, 5 specimens each, C. B. Magruder, Rockledge, Fla..... 10

Best plate of Yellow-fruited Shaddocks, 5 specimens, W. H. Backus, Riverside, Cal..... $10
Best exhibit of Grape Fruit, O. P. Rooks, Fruitland Park, Fla..... 10
Best exhibit of Orange Citrons the citron of commerce—O. P. Rooks, Fruitland Park, Fla..... 10
Best exhibit of Lemon Citrons, C. B. Magruder, Rock Ledge, Fla..... 10
Best general exhibit of Citrus Fruits, other than oranges, from the State of Florida, C. B. Magruder, Rock Ledge, Fla.... ..... Silver Medal. 50
Best general exhibit of Citrus Fruits, other than oranges, from the State of California, Kimball Bros., National City, Cal .....Silver Medal. 50

BANANAS.

Best bunch, any variety, from any foreign country, Wm. Agar, Belize, British Honduras..... 10
Best bunch of Hart's Choice, or Samana Bay, grown in the United States, O. P. Rooks, Fruitland Park, Fla..... 10
Best bunch of any other variety, grown in the United States, C. B. Magruder, Rock Ledge, Fla..... 10

PINE APPLES, ETC.

Best collection, 4 varieties, grown in foreign country, Botanical Department, Jamaica..... .....Silver Medal. 25
Best plate of Red Spanish, grown in the United States, O. P. Rooks, Fruitland Park, Fla 10
Best plate of Strawberry, grown in the United States, G. S. Hardee, Indian River, Fla..... 10
Best collection, varieties of Guavas, 12 specimens each, O. P. Rooks, Fruitland Park, Fla..... Silver Medal. 25
Best plate of Sapodilla, Wm. Agar, Belize, British Honduras..... 10
Best plate of Tamarinds, Wm. Agar, Belize, British Honduras..... 10
Best exhibit of Cocoanuts, Wm. Agar, Belize, British Honduras..... 10
Best specimen of Coffee tree in flower or fruit, Mexican Government, Silver Medal. 25

JAPAN PERSIMMONS.

Best collection, not less than 6 varieties, grown in the United States, correctly named, J. M. Rulifson, Mobile, Ala.....Silver Medal. 50
Best collection, 4 varieties, grown in the United States, correctly named, W. H. Jessup, Haywards, Cal..... ..... Silver Medal. 25
Best plate of Among, or Mikado, J. Fonta, New Orleans, La 10
Best plate of Gosho, C. W. Whittaker, Sonoma Co., Cal..... 10

Best plate of Hacheya, F. A. Kimball, National City, Cal $10
Best plate of any other variety, Maitre & Cook, New Orleans, La..... 10
Best specimen of Japan Persimmon trees in flower or fruit, in tubs or pots, W. W. Thompson, Smithville, Ga..... 20

POMEGRANATES, ETC.

Best collection of Pomegranates, not less than 4 varieties, 6 specimens each, John Rock, San Jose, Cal..... $10
Best plate of sweet Pomegranates, Mississippi Horticultural Society... 5
Best plate of sour Pomegranates, Mississippi Horticultural Society..... 5
Best plate of violet Pomegranates, Mississippi Horticultural Society..... 5
Best exhibit of Chinese Quinces, Mississippi Horticultural Society..... 10
Best exhibit of Japan Medlars, or so-called Japan Plum (*Eryobotrya*), O. P. Rooks, Fruitland Park, Fla..... 10
Best exhibit of soft-shelled Almonds, John Rock, San Jose, Cal..... 10
Best exhibit of round thin-shelled Pecans, Mississippi Horticultural Society..... 10
Best exhibit of long thin-shelled Pecans, Mississippi Horticultural Society..... 10
Best exhibit of varieties of fruits preserved whole in solution, in glass, not less than 100 jars from any State or country, Dr. H. E. McKay, Madison Station, Miss..... Gold Medal. 100
Best exhibit of varieties of fruits preserved whole in solution, in glass, not less than 100 jars, from Southern District, C E. Davis, Louisville, Ky..... Silver Medal. 100
Best exhibit of evaporated fruits, from Northern District, W. S. Plummer, Leavenworth, Kan..... Silver Medal. 50
Best exhibit of evaporated fruits, from Southern District, W. S. Plummer, Leavenworth, Kan..... Silver Medal. 50
Best exhibit of evaporated fruits, from Pacific District, W. S. Plummer, Leavenworth, Kan..... Silver Medal. 50

Sweepstakes on Citrus fruits, Florida Fruit-growers' Association.

SPECIAL PREMIUMS.

Recommended by judges, as follows:

To O. P. Rooks, Fruitland Park, Fla., $5 each for the following varieties of Oranges: Cunningham, Phares, Star, Pineapple, Peerless, Gary's Mediterranean Sweet, Portugal, Wolfskill, Bergamot, Summer Queen, Kum Kwat, Star Calyx and Florida.

To John Anderson, Ormond, Fla., the same amount for Wild Sweet and Halifax King Oranges.

To Arthur E. Rendle, New York City, a Gold Medal for one Conservatory and a Silver Medal for one Curvilinear Greenhouse.

To C. A. Miller & Co., Jacksonville, Fla., a Silver Medal for a fine general display of Citrus Fruits.

DIVISION OF PLANTS AND TREES.

NURSERY STOCK.

Best collection of standard Apple Trees, 1 year old, not less than 75 varieties, John Rock, San Jose, Cal..... $25

Best collection of dwarf, trained Apple Trees, not over 3 years old, 25 varieties, W. M. Samuels & Co., Clinton, Ky..... 20

Best collection of Crab Apple Trees, 2 and not over 3 years old, 25 varieties, J. M. Smith, Green Bay, Wis..... 20

Best collection of Almond Trees, 2 and not over 3 years old, not less than 6 varieties, John Rock, San Jose, Cal..... 10

Best collection of Apricot Trees, 1 and not over 2 years old, not less than 12 varieties, John Rock, San Jose, Cal..... 10

Best collection of Cherry Trees, on Mazzard stocks, not over 2 years old, and not less than 25 varieties, John Rock, San Jose, Cal..... 20

Best collection of Cherry Trees, on Mahaleb stocks, not over 2 years old, and not less than 25 varieties, W. M. Samuels, Clinton, Ky..... 20

Best collection of grafted varieties of Chestnut Trees, not over 3 years old, John Rock, San Jose, Cal..... 20

Best single Chestnut Tree, 10 feet or over, John Rock, San Jose, Cal... 10

Best collection of Fig Trees, not less than 12 varieties, John Rock, San Jose, Cal..... 20

Best collection of Fig Trees, not less than 5 varieties, John Rock, San Jose, Cal..... 15

Best single Fig Tree, John Rock, San Jose, Cal..... 10

Best collection of Mulberry Trees, not over 2 years old, John Rock, San Jose, Cal..... 20

Best collection of Olive Trees, not less than 6 varieties, John Rock, San Jose, Cal..... 20

Best collection of dwarf Orange Trees, grafted, Tokio Agricultural College, Japan..... 20

Best collection of Peach Trees, 1 year old, not less than 50 varieties, Coats & Tool, Napa, Cal..... 35

Best collection of Peach Trees, 1 year old, not less than 25 varieties, John Rock, San Jose, Cal..... 20

Best collection of standard Pear Trees, 1 year old, and not less than 50 varieties, John Rock, San Jose, Cal..... 35

Best collection of Oriental varieties Pear Trees, Wm. Parry, Parry, N. J. 20

Best single Pear Tree of LeConte variety, W. W. Thompson, Smithville, Ga..... $20
Best single Pear Tree of Kieffer variety, W. W. Thompson, Smithville, Ga..... 20
Best collection of Persimmon Trees, Japanese, 1 year old, from bud or graft, W. W. Thompson, Smithville, Ga..... 25
Best collection of Persimmon Trees, Japanese, 2 years old, from bud or graft, John Rock, San Jose, Cal..... 25
Best collection of Plum Trees, native types, 2 years old, Wisconsin Horticultural Society. 25
Best collection of Plum Trees, foreign types, not over two years old, John Rock, San Jose, Cal..... 25
Best collection of Walnut Trees, 3 or 4 years old, John Rock, San Jose, Cal..... 20
Best collection of Strawberry Plants in pots and in fruit, 6 varieties, H. E. McKay, Madison Station, Miss 15
Best exhibit of Grape Vines, including types of native and foreign species, with hybrids and crosses, growing in pots, T. V. Munson, Denison, Texas ..... Silver Medal. 50
Best collection of Fruit Trees, of all classes, adapted to the extreme Northwestern States, J. M. Smith, Green Bay, Wis.....Silver Medal, 100
Best collection of Fruit Trees, of all classes, adapted to the sections between the 42d and 35th parallels, W. G. Klee, Berkley, Cal., Silver Medal. 100
Best collection of Fruit Trees of all classes, except the citrus family, adapted to the Southern States below the 35th degree, W. M. Samuels & Co., Clinton, Ky .....Silver Medal. 100
Best collection of Japanese Persimmon Trees, grown outside of the United States, 1 year, from bud, Agricultural College, Tokio, Japan. Silver Medal.
Best collection of fruit trees, of all classes, adapted to extreme cold climates, Wisconsin Horticultural Society.. ....Silver Medal. 100
Best collection of fruit trees, of all classes, adapted to moderate climates, Croux & Fils, Valle de Sceaux, France.....Silver Medal. 100

EVERGREEN TREES AND SHRUBS.—CONIFERS.

Best collection adapted to the extreme Northern States, not less than 25 varieties, J. M. Smith, Green Bay, Wis.....Silver Medal. 100
Best collection adapted to Pacific Coast, not less than 50 varieties, John Rock, San Jose, Cal.....Silver Medal. 100
Best collection of Abies, J. M. Smith, Green Bay, Wis.....Silver Medal. 25
Best specimen of Abies, E. W. Allen, Portland, Oregon..... 10
Best collection of Araucaria, Maitre & Cook, New Orleans, La., Silver Medal. 25

Best specimen of Araucaria, Agricultural College, Columbia, Mo $10
Best collection of Biotia, W. M. Samuels, Clinton, Ky.....Silver Medal. 25
Best specimen of Biotia, W. M. Samuels, Clinton, Ky 10
Best collection of Cedrus, John Rock, San Jose, Cal.....Silver Medal. 25
Best collection of Cupressus, John Rock, San Jose, Cal .....Silver Medal. 25
Best specimen of Cupressus, John Rock, San Jose, Cal..... 10
Best collection of Juniperus, J. M. Smith, Green Bay, Wis..Silver Medal. 25
Best specimen of Juniperus, Agricultural College, Columbia, Mo..... 10
Best specimen of Picea, E. W. Allen, Portland, Ore..... 10
Best collection of Pinus, John Rock, San Jose, Cal.....Silver Medal. 25
Best specimen of Pinus, J. M. Smith, Green Bay, Wis... 10
Best specimen of Retinispora, W. M. Samuels, Clinton, Ky..... 10
Best collection of Taxus, John Rock, San Jose, Cal.....Silver Medal. 25
Best specimen of Taxus, John Rock, San Jose, Cal..... 10
Best collection of Thuya, J. M. Smith, Green Bay, Wis.....Silver Medal. 25
Best specimen of Thuya, J. M. Smith, Green Bay, Wis..... 10
Best collection of Conifers, other than above, Mexican Government, Silver Medal. 25

BROAD LEAVED EVERGREENS.

Best collection adapted to region south of 35th parallel, not less than 40 varieties, J. Fonta, New Orleans, La. .....Silver Medal. 100
Best collection adapted to Pacific coast, not less than 25 varieties, John Rock, San Jose, Cal.. ....Silver Medal. 100
Best collection of Berberis, John Rock, San Jose, Cal..... 10
Best collection of Buxus, John Rock, San Jose, Cal.. 10
Best specimen of Buxus, W. M. Samuels, Clinton, Ky..... ... 5
Best collection of Euonymus, John Rock, San Jose, Cal 20
Best specimen of Euonymus, John Rock, San Jose, Cal..... 5
Best specimen of Ilex, W. M. Samuels, Clinton, Ky..... 5
Best collection of Laurus, John Rock, San Jose, Cal..... 20
Best specimen of Laurus, J. Fonta, New Orleans, La..... 5
Best collection of Ligustrum, J. Fonta, New Orleans, La 10
Best specimen of Ligustrum, J. Fonta, New Orleans, La..... 5
Best specimen of Magnolia, J. Fonta, New Orleans, La..... 5
Best collection of Nerium, John Rock, San Jose, Cal.. 20
Best specimen of Nerium, W. M. Samuels, Clinton, Ky 5
Best specimen of Olea, J. Eblen, New Orleans, La..... 5
Best specimen of any species, other than above, W. M. Samuels, Clinton, Ky 5
Best exhibit of Magnolia Grandiflora, 20 specimens or more, not less than 10 feet in height, J. Fonta, New Orleans, La .... Silver Medal. 100
Best single specimen of Magnolia Grandiflora, J. Fonta, New Orleans.. 10
Best exhibit of Magnolia Fuscata, 20 specimens or more, J. Fonta, New Orleans, La.....Silver Medal. 100

Best exhibit, 10 specimens, Magnolia Fuscata, J. Eblen, New Orleans, La.	Silver Medal.	$50
Best single specimen of Magnolia Fuscata, J. Fonta, New Orleans, La..		10
Best collection of Pittosporum, California Horticultural Society.....		20
Best collection of Azalea Indica, 50 varieties, Gabriel Marc, Long Island, N. Y.		50
Best collection of Rhododendron, 100 varieties, Croux & Fils, Valle de Sceaux, France	Silver Medal.	100
Best collection of Rhododendron, 50 varieties, Boskoop Nursery Association, Boskoop, Holland	Silver Medal.	50
Best collection of Rhododendron, 25 varieties, Boskoop Nurse y Association, Boskoop, Holland	Silver Medal.	25
Best collection of Rhododendron, 12 varieties, Boskoop Nursery Association, Boskoop, Holland	Silver Medal.	15
Best collection of North American trees, not less than 100 species, six feet or more in height, Geo. P. Peffer, Pewaukee, Wis.	Gold Medal.	200
Best collection of flowering shrubs, adapted to extreme cold climates, 50 or more varieties, Wisconsin Horticultural Society.	Silver Medal.	50
Best collection of flowering shrubs, for Pacific Coast, 50 or more varieties, John Rock, San Jose, Cal	Silver Medal.	50
Best collection of Althea, W. M. Samuels, Clinton, Ky		10
Best collection of Philadelphus, W. M. Samuels, Clinton, Ky		10
Best collection of Viburnum, J. M. Smith, Green Bay, Wis		10
Best collection of Bourbon Roses, John Rock, San Jose, Cal		20
Best collection of China Roses, John Rock, San Jose, Cal		20
Best collection of Hybrid Roses, John Rock, San Jose, Cal		25
Best collection of Noisette Roses, John Rock, San Jose, Cal		20
Best collection of Tea Roses, John Rock, San Jose Cal		25
Best collection, not less than 100 varieties, of Roses, John Fonta, New Orleans, La	Silver Medal.	100
Best general collection, 50 varieties, of Roses, John Rock, San Jose, Cal.,	Silver Medal.	50
Best general collection, 25 varieties, of Roses, John Rock, San Jose, Cal.,	Silver Medal.	25
Best general collection, 12 varieties, of Roses, John Rock, San Jose, Cal.,	Silver Medal.	20
Best collection of Hyacinth Bulbs, General Bulb Company, Vogelenzang, Holland	Silver Medal.	25
Best collection of Tulip Bulbs, General Bulb Company, Vogelenzang, Holland	Silver Medal.	50
Best collection of Crocus Bulbs, General Bulb Company, Vogelenzang, Holland		20
Best collection of Narcissus Bulbs, General Bulb Company, Vogelenzang, Holland		20

Best collection of Anemone Bulbs, General Bulb Company, Vogelenzang, Holland $10

Best collection of Ranunculus Bulbs, General Bulb Company, Vogelenzang, Holland..... 10

Best general exhibit of Bulbs, to occupy not less than 10,000 square feet of ground, General Bulb Company, Vogelenzang, Holland..... Gold Medal. 200

Best general exhibit of Bulbs, to occupy not less than 2,000 square feet of ground, General Bulb Company, Vogelenzang, Holland..... Silver Medal. 50

Best general exhibit of Bulbs. to occupy not less than 1,000 square feet of ground, General Bulb Company, Vogelenzang, Holland. Silver Medal. 25

Best collection of Coleus Plants, E. Baker, New Orleans.. Silver Medal. 50

Best collection of Geraniums, Zonale, double, J. Fonta, New Orleans. Silver Medal. 50

Best collection Verbenas, E. Baker, New Orleans .....Silver Medal. 25

Best collection of Palms and Cycads, 25 varieties or more, Maitre & Cook, New Orleans..... .....Gold Medal. 200

Best collection of Palms and Cycads, 10 varieties or more, Botanical Department, Jamaica.....Silver Medal. 100

Best collection of Palms and Cycads, 5 varieties, Mexican Government. Silver Medal. 50

Best specimen of Royal Palm, 20 feet or more in height, Don a'Ciano, Lara, Mexico..... .....Gold Medal. 100

Best specimen of Royal Palm, 10 feet or more in height, Don a'Ciano, Lara, Mexico..... .....Siver Medal, 50

Best specimen Date Palm, 10 feet or more, California Horticultural Society ....Silver Medal. 50

Best specimen any other species, 20 feet or more, Don a'Cian · Lara, Mexico..... .....Gold Medal. 100

Best specimen any other species, 10 feet or more, Mexican Government, Silver Medal. 50

Best collection, 50 or more varieties, of Ferns, Maitre & Cook, New Orleans, La... .....Silver Medal. 100

Best single specimen Tree Fern, Mexican Government.. 25

Best collection, 25 varieties, Ferns, grown in Southern States, J. Eblen, New Orleans, La .....Silver Medal. 25

Best collection Ferns grown outside the United States, 50 varieties, Botanical Department, Jamaica..... .....Silver Medal. 50

Best collection of Orchids in bloom, 25 varieties, Mexican Government, Silver Medal. 50

Best collection of Orchids in bloom, 10 varieties, Rafael Montes de Oca, Mexico..... .....Silver Medal. 25

Best single specimen, Rafael Montes de Oca, Mexico..... 10

Best collection of Begonia, not less than 30 varieties, Maitre & Cook, New Orleans, La.....Silver Medal. $50
Best collection of Begonia, 20 varieties, E. Baker, New Orleans, La. Silver Medal. 25
Best collection of Coleus, 50 varieties, J. H. Menhard, New Orleans, La., Silver Medal. 50
Best collection of Crotons, 20 varieties, Maitre & Cook, New Orleans, La., Silver Medal. 50
Best collection of Cactus, 50 varieties, J. H. Wishner & Co. San Antonio, Texas.....Silver Medal. 50
Best collection of Cactus, 25 varieties, J. H. Wishner & Co., San Antonio, Texas.....Silver Medal. 25
Best collection of Dracæna, 10 varieties, Maitre & Cook, New Orleans, La.....Silver Medal. 25
Best collection of Geranium, Zonale, 50 varieties, E. Baker, New Orleans, La.....Silver Medal. 50
Best collection of Geranium, Zonale, 25 varieties, J. Eblen, New Orleans, La.....Silver Medal. 25
Best general exhibit of greenhouse plants not included above, not less than 100 varieties, Maitre & Cook, New Orleans, La...Silver Medal. 100
Best general exhibit of greenhouse plants not included above, not less than 25 varieties, E. Baker, New Orleans, La.....Silver Medal. 25
Best collection of Agave, 10 varieties, J. H. Wishner & Co., San Antonio, Texas.....Silver Medal. 50
Best collection of Cactus, 50 varieties, J. H. Wishner & Co., San Antonio, Texas.....Silver Medal. 50
Best collection of Pelargonium, 25 varieties, large-flowered, Mexican Government.....Silver Medal. 25
Best exhibit of greehouse plants, not named above, not less than 50 varieties, Mexican Government.....Silver Medal. 50
Best collection of living medicinal plants, not less than 200 species, S. S. Connor, Amite City, La.....Silver Medal. 50
Best collection of living fibre plants, not less than 40 species, Mexican Government.....Silver Medal. 100
Best exhibit of 200 deciduous and evergreen trees, planted on one acre of ground with reference to artistic effect, W. M. Samuels & Co., Clinton, Ky..... 150

SPECIAL PREMIUMS.

The judges recommended an award of a Silver Medal to the Mexican Government for collection of Cacti; to same for collection of Agaves.

To J. Eblen, New Orleans, for specimen of Sago Palm.

To E. H. Krelage & Son, Holland, for a fine collection of Dutch Bulbs.

To P. M. Augur & Sons, Middlefield, Conn., for collection of Strawberry plants in fruit.

To J. T. Lovett, Little Silver, N. J., for an exhibit of Strawberry plants in fruit.

To J. Cheal & Sons, Crowley, Sussex, England, for an exhibit of Cordon Trained Fruit Trees.

To Croux & Fils, Valle de Sceaux, France, for an exhibit of Cordon Trained Fruit Trees.

To J. H. Wishner & Co., San Antonio, Texas, $15 for a collection of Yucca, and $10 for a collection of Aloes.

HUMOROUS EXPERIENCE OF A DUTCH VINEYARDIST;

AS RELATED BY HIMSELF.

[This communication, addressed to the Society at its late meeting in New Orleans, is the recital of the experience of one of the largest grape-growers in the West, and one whose name is as familiar as "household words" to all Mississippi Valley horticulturists. The prominence of the author as a grape-grower will be the Secretary's only apology for publishing the following:]

BLOOMINGTON, ILLINOIS, January 11, 1885.

To the Hon. President and my breathern Horti and Vitti Culturists assembled in New Orleans:

For nearly 40 years I am now in the vineyart bussiness, my vines are my friends my laborers and soldiers; I talk with them and try to get there confidence and there secrets, and they often open there hearts to me and show me in silence words there little trubels. 35 years ago I had the first and best Catawba vineyards in the West of Cincinnati; I never will forgot the most Paradisic sight of the two first crops of fruit. The Lord seamed to be with me in my vineyards to guide the vines and show me his love to me. But the 3th crop he left me alone and the rot set in. The 4th crop the other, the bad man, the schwarge Teufel took hold of my poor Catawbas, and I began to doctor my poor pations with sulphur, baggs, and all kinds of nasty medicines. Brothers Fuller, Dr. Warder, Dr. Grant of the Ione fame, all celebrities, proscribed for my suffering pations, but poor little grapi got the itsh and dropped dead to *the cold air bottom*, to rot like other little engels. My tears dit not bring them back to rosy live. My Catawba vineyard looket to me like the adjoining grave yart, where fathers and mothers came and shet there tears over the graves of there little ones. O do not overdraw the picture and cling to romances, I ask some of you earnest horticulturist who lost there hopes to mourn with me.

Well I propped up again and introduced the grape of the million the Concord $5 each, and no money to pay for them. I propagatet them silently estensively and plantet the largest Concord vineyard then, and I invitet the Lord again to stay with me in the vineyart, and he dit it faithfully, and by his guidance and help I was in glory of the first 3 and 4 crops. The Lord

left me again and the bad man came and made poor grapi drop and shut up. Tears again, and I looket out for a new Emigrant, Iona, Diana, Deleware, Herbemont, Virgini and others came and promissed thanks for my work and kind attentions. The Herbemont was a Spainiard and cut not stand the climat, dit not pay his board and left me. The Delaware took first the itsh from the Clinton, tore up there nice Dolly Varding and became as nacked as Adam in the Paradise and offered me the little grapi for vinegar. The Iona and Diana played Mama Catawba on me, but the Norton Virginia shuk hands mit me and said, "I will stay mit you til Saint John blowes his horn; as I am not fit on the tables of the rich you can put me in the vat." But the horn of St John soundet here and poor grapi most go like Melican man make go the Chinee.

Now what was the cause of all my lost hopes? *The grape rot my friends.* And as an old radical physician I have tried hard to find and remove the cause, and "I took the cow by the tail." I went down in the ground and examined the roots and the soil. My gronds are closely underlaid mit hard clay and the main roots went down 2 to 4 ft deep in this clay and took cold, dit not find the limestone or gravel it seeket and needet. Cutting the roots I found them nearly petrifiet the outside bark of the roots woody and rotten and unable to transport the sap. This is not so in California, part of Kansas and other places with a lime stone bottom. I then wrote an essay on a new system of grape culture, but being a "Dutchman" and dit not give my pleas a larger spreat the system died; that is now 15 years. My plan was to renew without the disturbance of the vineyard by layering every 2 years to the distant of 4 feet a new vineyard and chop the old vines out. My trial was a good one. But I quittet the vineyard bussiness for 6 yers till old love brought me back with new vigor and on a larger scale than ever before.

My experiments grow with my old age, and since the new discoveries of Bacterias, Baccilles, etc., I begun a new studio in vinticulture. I find that the deseased dropped berris contain the devil grape rot and depositet the same in the grond near the vines and when the right

Opportunitees

are given the Bacterias begin there destruction a new. The best remedy is to pick up all the rotten berries and destroy them in carbolic acid water. For the Mildew Parasites or Baccilles I recomend the more powerfull arsenic water applied before the fruit collers; if no rain followes after the ripening I recoment to sprinkle the grapes a few days or a week before picking. Now my wise frients, please give this matter your attention.

Now the Grape Louse

Phyloxera as the close of my epistel Twenty years ago when the desease brook out in France I gave this matter an earnest thought; and as I have relessed many people of lise with quicksilver salve the *unguentum mercurialis* (that sounds better in Latin and the apothecarist charges 100 per cent more

for the Latin). I was convinced if this medicament cures or destries human lice, it will do mixet mit dry clay and put unter the new plantet vine or near the roots of old vines to destoy also the grape louse. I recomendet this remedy to Count Bismarck a long while ago to be tryed in the German lousy vineyards. If the Latin man will ellow it.

Now my frients I most close and most beg for pardoning me for my long epistel; but as I can not be with you on account of my extensive pussiness and old age I be with you in spirit, and can hardly wait to hear what you wise man all had to say.

Wishing you a profitapel meeting a fine exhibition and much joy mit and mitout your good wifes, I am your old frient and co-laborer

DR. H. SCHRŒDER. (the old Dutch Doctor.)

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